

RANGE PLANT COMMUNITY TYPES
AND CARRYING CAPACITY
FOR THE
MONTANE SUBREGION
OF ALBERTA



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RANGE PLANT COMMUNITY TYPES AND CARRYING CAPACITY FOR THE MONTANE SUBREGION

Third approximation

1998

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Figure 1. Rolling topography of the Athabasca subregion. This illustrates the grassland structure and grassland forest ecotone of the Athabasca subregion.



Photo 1. Rolling topography of the Montane subregion: This illustrates the grassland-shrubland and grassland-forest ecotones of the Montane subregion.



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Abstract

The Montane subregion is one of the most diverse subregions within the province of Alberta. The ecological diversity of this subregion creates a landscape that consists of a mosaic of different vegetative communities. This diversity means that these lands are valued for a multitude of uses, including summer range for livestock, prime habitat for many species of wildlife, productive watersheds, wood fibre production and recreation. Despite the importance of many of the vegetation types in the Montane for livestock grazing, there is little information available on how grazing influences the plant community. There is little information on forage productivity, carrying capacity and the associated community types that develop through succession or from disturbance including grazing. This lack of information makes it difficult to develop management prescriptions. As a result "Carrying capacity guides" are being developed for each natural and subregion in the province to provide a framework that would easily group the vegetative community types. It is hoped this classification system can be used by field staff to assess carrying capacity and evaluate range condition on lands within each region.

This guide represents the analysis of 889 plots described in the Montane subregion and the Southerneast slopes region and Banff and Jasper National Parks. This guide also includes 8 new community types described in the Ya Ha Tinda area west of Sundre. The 889 plots represent 110 community types. These types are split into:

A. Native grasslands (Banff and Jasper Mountain ecodistricts)	14 types
B. Native grasslands (Blairmore and Morley Foothills ecodistricts)	16 types
C. Disturbed grasslands (Blairmore and Morley Foothills ecodistricts)	10 types
D. Native shrublands	13 types
E. Conifer types	22 types
F. Mixedwood types	12 types
G. Deciduous types	15 types
H. Cutblocks	8 types

The dominant plant species, canopy cover, environmental conditions, response to grazing, forage production and carrying capacity are outlined for each type.

Introduction

The province of Alberta is covered by a broad spectrum of vegetation regions from prairie in the South, to alpine vegetation in the mountains and dense forests in the Central and Northern part of the province. These broad vegetation regions have been classified into 20 subregions for the province (Strong and Thompson 1995). Each of the 20 subregions consists of groups of plant communities which are influenced by environmental conditions and human impacts. Intensive management of these regions requires the ability to recognize the vegetative communities that have similar productivities and respond to disturbance in the same way. The increase in use of Alberta's northern forests has recently stimulated efforts to develop detailed classification systems. Some of these classification systems include "Field guide to Forest ecosystems of West Central Alberta" (Corns and Annas 1986) and "Field Guide to Ecosites of Southwestern Alberta" (Archibald et al. 1996).

The vegetative communities in the province of Alberta are highly regarded by most resource managers for their ability to provide a wide variety of benefits. They are a classic example of multiple use land, providing summer range for livestock, prime habitat for many species of wildlife, wood fibre, productive watersheds and recreational areas. Despite the importance of these vegetation types for livestock grazing, there is little information available on how grazing affects their production. Specifically, there is little data on the levels of utilization which are detrimental to a plant communities health. There is also little information on forage productivity, carrying capacity and associated community types that occurs with grazing. Traditionally, these community types have been rated at 5 ac/AUM or 60 ac/head/year, but recent work has shown that productivity can vary significantly depending upon the ecological conditions of the site.

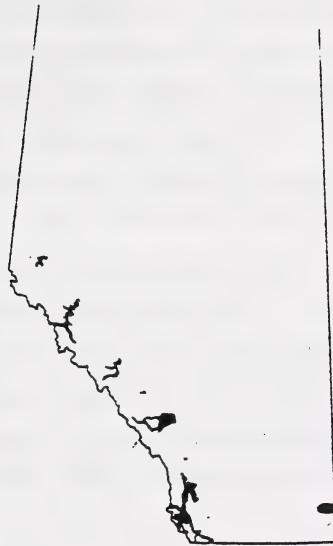
The purpose of this guide was to develop a framework that would easily group the vegetative community types in the Montane subregion of the province. The ultimate goal is a classification system that can be used by the field staff to assess carrying capacity and evaluate range condition on lands within the region.

Climate of Montane subregion

The Montane subregion composes only 0.9 percent of the province and is found in an area south of Chain Lakes to the Montana border, portions of the Bow and Athabasca river valleys and isolated areas near Ya Ha Tinda and Grande Cache (Map 1) (Strong and Leggat 1992). The Montane is distinguished from the other subregions by the presence of Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*) and lodgepole pine (*Pinus contorta*). Elevationally the Montane occurs below the Subalpine in the mountains and above the Foothills Fescue grass and Aspen parkland subregions in southern Alberta.

Yearly precipitation ranges 308 mm to 1279 mm with two precipitation peaks occurring in May-June and again in August-September (Strong 1992). Summer monthly temperatures average 11.9°C and are 2°C warmer than the Subalpine and 2°C colder than the Foothills Fescue

subregions. The Montane has the warmest winter temperatures of any forested region in Alberta because of chinook activity and reduced influence of Arctic air (Strong 1992).



Map 1. Location of Montane subregion in Alberta

Methods

A community type approach (Mueggler 1988) to classification was chosen in preference to the habitat type approach (Daubenmire 1952) or ecosystem association approach (Corns and Annas 1986) because of the lack of understanding of the successional sequences of the communities. Community types are aggregates of similar plant communities based upon existing floristics regardless of successional status (Mueggler 1988). Community types are what is actually seen in the field. After defining the community types, they then can be linked to the ecosystem associations. In the mean time community types can be used as the basis for mapping and range management planning.

Initially, grazing dispositions were inventoried by forest region in order to develop management plans following the procedure outlined in the Rangeland Resource Information System (1991). Individual plots were initially classified within a forest region using cluster analysis (SAS) and ordination (DECORANA, Gauch 1982). These types were described in individual carrying capacity guides for each forest. This led to differences in classification of the same types between forests, particularly for deciduous forest types. In an effort to standardize the community name and gain some understanding of each community types ecology, all plots sampled in each forest were reclassified. As the study progressed it became quite evident that

there were differences in the productivity of the communities between ecoregions. As a result, it was decided to develop the classification within the ecoregion framework (Strong and Leggat 1992). An ecoregion is a geographical area that has broad vegetation zones combined with climatic data (Strong and Anderson 1980). As a result, the vegetation within each ecoregion is strongly influenced by the climatic conditions. Recently, the department has adapted the Natural and Subregions of Alberta classification system. This system incorporates the Natural regions and subregions classification used by Parks with the Ecoregions of Alberta classification used by Forestry, Lands and Wildlife. The Montane subregion and ecoregion share the same boundary.

Sampling for this guide occurred within the Montane subregion. This guide outlines the classification of 889 plots described in Banff and Jasper National Parks and Southeastern slopes forest region.

A plot consisted of a 10x10 m macroplot and ten randomly selected 1x1 m microplots to record the canopy cover of shrubs and ten nested 20x50 cm microplots to record the canopy cover of forbs and grass. The inventory followed the Range Survey Manual (1992) and uses the MF5 form. At each macroplot a 50x100 cm was clipped and separated into trees, shrubs, forbs and graminoids, oven dried and weighed. The recommended stocking rate is based on 25 percent of the total production for forested types and 50% total production for grass and shrubland types and the fact that one animal unit (1000 pd animal) requires 455 kg of dry weight material for one month of grazing.

How to use the guide

Decide what category the community type is in. If it is in the **Native grass or Shrub categories** it will not have tree cover and be found on steep south facing slopes or moist lowland areas adjacent to streams and rivers. The predominant species will be native grasses, willow and bog birch. The **Disturbed grassland** community types will resemble the native grassland community types, but will show signs of extensive grazing pressure. These community types will be dominated by grazing resistant species Kentucky bluegrass, clover and dandelion. A couple of moderately grazed community types with a predominant native species cover are also found in this category.

The **Deciduous category** will be plant communities dominated by deciduous tree species aspen and balsam poplar and the **Conifer category** will be plant communities dominated by subalpine fir, Engelmann or white spruce, lodgepole pine, limber pine, black spruce, larch or Douglas fir tree species. The **Mixedwood category** will contain communities that will have at least 50% of the total tree cover as conifer or deciduous. Finally the **Cutblock category** contains the types that have had timber harvesting.

In order to understand how the community types in this guide are related to the ecosites and ecosite phases outlined in "Ecosites of Southwestern Alberta" (Archibald et al. 1996), the community types in this guide are arranged by ecosite and ecosite phase (Table 1). **Ecosites** are defined as ecological units that develop under similar environmental influences (climate, moisture and nutrient regime). An **ecosite phase** is a subdivision of the ecosite based on the dominant species in the canopy. Table 1 is a reproduction of Figure 17 in the Ecosites of Southwestern Alberta guide with the community types in this guide highlighted. For the most part the ecosites and ecosite phases are the same, particularly for the forested community types, but a number of new ecosites and ecosite phases had to be created for the grass and shrubland community types (Table 1). The ecosites included (aa)(subxeric/medium) bluebunch wheatgrass, (cc)(submesic/rich) rough fescue grassland, (h) (subhydric/rich) rich fen and (i) (subhydric/medium) poor fen. The ecosite phases include (aa1) bluebunch wheatgrass, (aa2) big sagebrush, (aa3) rough fescue, (b4) yellow mtn. avens, (b5) bearberry grassland, (c5) idaho fescue grassland, (c6) rough fescue grassland, (d4) white meadowsweet Aw, (d5) bog birch shrubland, (e4) shrubland, (f2) shrubland, (f3) grassland, and (g3) horsetail shrubland. The "Grazing succession" category (Table 1) outlines the successional sequence the community type will undergo with increased grazing pressure.

Table 1. Ecosites, ecosite phases and plant community types for the Montane subregion (adapted from Archibald et al. 1996)(highlighted communities are described in this guide, non-highlighted communities are outlined in guide to "Ecosites of Southwestern Alberta")

Ecosite	Ecosite Phase	Plant Community Type	Grazing succession
a limber pine/juniper (subxeric/poor)	a1 limber pine/juniper Fd-Pf	a1.1 Fd-Pf/juniper E2 Pf-Fd/Juniper/Bearberry	
aa Bluebunch wheatgrass grassland (subxeric/medium)	aa1 Bluebunch wheatgrass	B3 Bluebunch wheatgrass-Sedge A1 Fringed sage/Junegrass A2 Northern wheatgrass-Sheep fescue A3 Small leaved everlasting/Junegrass	C6. Blunt sedge/Little clubmoss/Moss phlox A6. Kentucky bluegrass-Junegrass/Dandelion
	aa2 Big sagebrush	B5. Big sagebrush/B. wheatgrass-Sedge	
	aa3 Rough fescue	A12. Rough fescue-Sedge-Junegrass	
b bearberry (submesic/poor)	b1 bearberry P1	b1.1 P1/bearberry-juniper E3 P1/Bearberry-Juniper	
	b2 bearberry Aw	b2.1 Aw/bearberry F1 Aw-Fd/Bearberry G1 Aw/Bearberry/Rough fescue	
	b3 bearberry Aw-Sw-P1	b3.1 Aw-Sw-P1/Bearberry E4 Sw-P1/Alder/Bearberry	
	b4 yellow mtn. avens	D1 Yellow Mtn. Avens-River alder/Low forb D2 Yellow Mtn. Avens/Junegrass F2 Sw-P1-Pb/Yellow Mtn. avens	

	b5 bearberry grassland	A4 Creeping juniper/N. wheatgrass-C. needlegrass A5 Little clubmoss/Richardson needlegrass A7. Bearberry-Juniper B6 Snowberry-Rose-Saskatoon/Bearberry	
c Canada buffalo-berry/hairy wild rye (submesic/medium)	c1 Canada buffalo-berry/hairy wild rye Fd	c1.1 Fd/needle litter	
		c1.2 Fd/hairy wild rye E6 Fd/Hairy wildrye	
	c2 Canada buffalo-berry/hairy wild rye P1	c2.1 P1/Canada buffalo-berry/hairy wild rye E5 P1/Bufaloberry/Pinegrass E7 P1/Dwarf bilberry/Hairy wildrye	
	c3 Canada buffalo-berry/hairy wild rye Aw	c3.1 Aw/hairy wild rye F3 Aw-P1/Bufaloberry/Hairy wildrye G2 Aw/Rose/Hairy wildrye G3 Aw/Hairy wildrye	
	c4 Canada buffalo-berry/hairy rye Aw-Sw-P1-Fd	c4.1 Aw-Sw-P1-Fd/hairy wild rye F5 Aw-Sw/Blueberry	
	c5 Idaho fescue grassland	B2 Idaho fescue-Parry oatgrass-Rough fescue B4 Rough fescue-Sedge/Bearberry E1 P1/Rough fescue	
	c6 Rough fescue grassland	A11. Rough fescue-Fringed brome-Sedge	A13. Sedge-Junegrass

cc Rough fescue grassland (submesic/rich)	cc1 Rough fescue	B1 Rough fescue-Idaho fescue-Parry oatgrass B15 Rough fescue-Hairy wildrye Forest succession B8 Fd/I.fescue-R.fescue B9 Fd/I.fescue-S.bluegrass B10 Aw/Strawberry/R. fescue A8 Prickly rose-Snowberry	C1 I. fescue-P.oatgrass-Sedge C2 C. bluegrass-R. fescue C3 K. bluegrass-R. fescue C4 K.bluegrass-Timothy/Dandelion C5 S. brome-K.bluegrass C8 C. red fescue/Dandelion-Clover C9 R.fescue-K.bluegrass C10 R.fescue-Sedge-Mtn. brome
d creeping mahonia-white meadowsweet (mesic/medium)	d1 creeping mahonia-white meadowsweet Fd	d1.1 Fd/feather moss d1.2 Fd/white meadowsweet E10 Sw-Fd/White meadowsweet F6 Aw-Fd/White meadowsweet	
	d2 creeping mahonia-white meadowsweet P1	d2.1 P1/green alder d2.2 P1/creeping mahonia-white meadowsweet E8 P1/White meadowsweet E9 P1/Pinegrass F4 Aw-P1/Pinegrass	
		d2.3 P1/pine grass	
		d2.4 P1/mountain lover/bear grass	
		d2.5 P1/feather moss	
		E11 P1/Moss	
	d3 creeping mahonia-white meadowsweet Sw	d3.1 Sw/feather moss E12 Sw/Moss	

e	d4 white meadowsweet Aw	B7 Pinegrass-Hairy wildrye/Strawberry G4 Aw/White meadowsweet/Pinegrass G5 Aw/Rose/Pinegrass	G6 Aw/Pinegrass-K. bluegrass
	d5 bog birch shrubland	A10. Bog birch-Sedge-Rough fescue	
	e1 thimbleberry/pine grass P1	e1.1 Pl/thimbleberry E13 Pl/Thimble berry E14 Pl/Thimbleberry/Beargrass E15 Pl/River alder/Thimbleberry	
f	e2 thimbleberry/pine grass Aw	e2.1 Aw/thimbleberry G10 Aw/Thimbleberry G11 Aw/Cow parsnip	
		e2.2 Aw/pine grass F7 Aw-Pb-Sw/Pinegrass	G7 Aw/Timothy-K. bluegrass
		e2.3 Aw/saskatoon-snowberry F8 Aw-Fa/Snowberry/Pinegrass G8 Aw/Snowberry-Saskatoon	F9 Pl-Aw/Snowberry/K. bluegrass F10 Aw-Fa-Se/Timothy G9 Aw/Snowberry/K. bluegrass
	e3 thimbleberry/pine grass Sw	e3.1 Sw/thimbleberry E16 Sw/Thimbleberry	
	e4 shrubland	B11 Thimbleberry brush	
f	fl balsam poplar Pb	fl.1 Pb/snowberry F11 Spruce-Pb/Snowberry G12 Pb/Thimbleberry G14 Pb/Snowberry	G13 Pb/Cow parsnip/K. bluegrass

f2	shrubland	D3 Beaked willow/Hairy wildrye D4 T.Honeysuckle-Rose-Willow/Nettle D5 G.alder-S.willow-Raspberry D10 Dwarf birch-S.cinquefoil/Valerian/Sedge D13 Water birch-Smooth willow/Pinegrass G15 Aw/Birch-Willow	D6 Flat lv'd willow/Quackgrass-K. bluegrass
		B13 Tufted hairgrass-Baltic rush B14 Forb meadows A9 Tufted hairgrass-Sedge	
		g1.1 Sw-Pb/horsetail	
		g2.1 Sw/horsetail F12 Sw-Aw/Scouring rush	
		g2.2 Sw/dogwood	
g	horsetail (hygric/rich)	g3 horsetail shrubland	
		h1 shrubby rich fen	D8 Willow/Sedge-Marsh reedgrass D9 Bog birch-Basket willow-Myrtle lv'd willow D11 Sw/Willow/Water sedge/Golden moss
		h2 graminoid rich fen	B12 Sedge meadows
		i1 treed poor fen	E17 Sb-Lt/Labrador tea D12 Sb/Willow/Wire rush-Sedge/Moss
h	rich fen (subhydric/rich)		
i	poor fen (subhydric/medium)		

Results

The analysis of the 889 plots distinguished 110 community types. These types were split into 8 categories:

A. Native grasslands (Banff and Jasper Mountain ecodistricts)	14 types
B. Native grasslands (Blairmore and Morley Foothills ecodistricts)	16 types
C. Disturbed grasslands (Blairmore and Morley Foothills ecodistricts)	10 types
D. Native shrublands	13 types
E. Conifer types	22 types
F. Mixedwood types	12 types
G. Deciduous types	15 types
H. Cutblocks	8 types

The dominant plant species, canopy cover, environmental conditions, forage production and carrying capacity are outlined for each community type.

Montane grassland ecology

The Montane subregion has highly variable ecological conditions. Much of the variation is the result of complex topography, while the small size of individual ecosystems results in a strong ecotonal effect from the surrounding environments (Strong 1992). Much of the grassland vegetation occurs on south and west facing slopes where seasonally low rainfall coupled with high evapotranspiration, dries the soil sufficiently to kill tree seedlings (Daubenmire 1978). Fire is also an important factor in determining the composition of grasslands because of the high flammability of the vegetation during the dry periods. A lack of fire and an increase in annual precipitation favours the growth of trees onto the more mesic sites.

The Whaleback ridge, Porcupine Hills and south into the Castle area are composed of a mixture of rough fescue grassland, aspen, Douglas fir and lodgepole pine. This area is characteristic of the Blairmore and Morley Foothills ecodistricts (Strong and Thompson 1995) an area of ridged and rolling hills, with moderate slopes (6-30%) and Black Chernozemic soils on submesic to mesic sites. In the Banff and Jasper river valleys and northern Montane areas (Grande Cache, Red Deer river valley) open Douglas fir, lodgepole pine and Fringed sage/Junegrass communities are common on steep south facing slopes, shallow rocky soils and coarse textured outwash (Strong 1992). These areas are typical of the Banff and Jasper Mountain ecodistricts. These ecodistricts have steep slopes (10-45%) and are dominated by Eutric Brunisolic soils, with submesic to xeric moisture regimes (Strong 1992). The grassland community types of the Montane subregion are outlined in Table 2.

Banff and Jasper Mountain ecodistricts

The two dominant grassland communities in Banff and Jasper National Park include the Fringed sage/Junegrass and Northern wheatgrass-Sheep fescue community types. These communities are typical of steep, south and westerly facing slopes with xeric to subxeric moisture regimes. The soils are poorly developed and nutrient poor. Variants of these community types included the Pussy toes/Junegrass community, which is also found on shallow, south facing slopes and the Juniper/Northern wheatgrass community which is typical of regosolic, eolian sand dunes of the Athabasca river valley near Jasper (Corns and Achuff 1982). A Little clubmoss/Richardson needlgrass community was also found on shallow south facing slopes in small isolated areas within the fir, white spruce, lodgepole pine and douglas fir forests.

A Kentucky bluegrass-Junegrass/Dandelion community type was described on lower to level slope positions with submesic to subxeric moisture regimes. The presence of a high cover of Junegrass indicates the close affinity this grassland has with the Fringed sage/Junegrass community type. The high cover of Kentucky bluegrass is indicative of heavy grazing influence on this community type.

There were two upland shrub communities found on steep south facing slopes (Bearberry/Juniper and Rose-Snowberry). These community types represented the transition from grassland to forest. The Bearberry/Juniper community type represents the transition from the grassland communities to the dry lodgepole pine, douglas fir and spruce forests. In contrast the Rose-Snowberry shrubland appears to represent the transition to moister deciduous and

Table 2. Grassland community types of the Montane subregion.

Community name	Community type	Grass	Forb	Shrub	Total	Moisture	Drainage	Carrying capacity (ha/AUM)
Banff and Jasper Mountain ecodistricts								
A.				250-750*				
A1.	Fringed sage/Junegrass					Subxeric	Rapidly	4-18
A2.	Northern wheatgrass-Sheep fescue			400*		Subxeric	Rapidly	4.0
A3.	Small leaved everlasting/Junegrass			250*		Xeric	Rapidly	18.0
A4.	Juniper/Northern wheatgrass-Columbia needlegress							
				250*		Xeric	Rapidly	18.0
A5.	Little clubmoss/Richardson needlegrass			385*		Subxeric	Rapidly	2.4
A6.	Kentucky bluegrass-Junegrass/Dandelion			1500*		Submesic	Well	0.6
A7.	Bearberry/Juniper			500*		Subxeric	Well	Non-use
A8.	Rose-Snowberry			750*		Submesic	Well	3.0
Ya Ha Tinda Area								
A9.	Tufted hairgrass-Sedge	1208	98			Subhygric	Mod. Well	1.1
A10.	Bog birch/Sedge-Rough fescue	592	198	12		Mesic	Well	1.7
A11.	Rough fescue-Fringed brome-Sedge	802	322	82		Submesic	Well	1.1
A12.	Rough fescue-Sedge-Junegrass	584	228	69		Subxeric	Rapidly	1.5
A13.	Sedge-Junegrass	451	71	5		Submesic	Well	2.6
A14.	Creeping red fescue-Timothy					Mesic	Well	0.9
Blairmore and Morley Foothills ecodistricts								
B.								
B1.	Rough fescue-Idaho fescue-Parry oatgrass	1447	536	69		Mesic	Well	0.5
B2.	Idaho fescue-Parry oatgrass-Rough fescue	1194	361	43		Submesic	Well	0.6
B3.	Bluebunch wheatgrass-Sedge	513	1119			Subxeric	Rapidly	0.6
B4.	Rough fescue-Sedge/Bearberry	1010	571	227		Submesic	Well	0.5
B5.	Big sagebrush/B. wheatgrass-Sedge					Subxeric	Rapidly	1.8
B6.	Snowberry-Rose-Saskatoon/Bearberry	604	598	238		Submesic	Well	0.7
B7.	Pinegrass-Hairy wildrye/Strawberry	1487	1003			Mesic	Well	0.4
B8.	Douglas fir/Idaho fescue-Rough fescue					Submesic	Well	0.5

Table 2. Grassland community types of the Montane subregion (continued).

Community name	Community type	Grass	Forb	Shrub	Productivity(kg/Ha)	Total	Moisture	Drainage	Carrying capacity (ha/AUM)
B9.	Douglas fir/Idaho fescue-Sandberg bluegrass					1750*	Submesic	Well	0.5
B10.	Aw/Strawberry/Rough fescue					1750*	Mesic	Mod. Well	0.5
B11.	Thimbleberry	2190	25	186		2632	Subhygric	Mod. Well	0.7
B12.	Sedge meadow					1750*	Hydric	Poorly	0.5
B13.	Tufted hairgrass-Baltic rush					1750*	Subhygric	Mod. Well	0.5
B14.	Forb meadows					1750*	Subhygric	Well	0.5
B15.	Rough fescue-Hairy wildrye	1580	598	44		2222	Mesic	Well	0.4
B16.	Big sagebrush-Buckthorn/K. bluegrass	1000	500	400		1900*	Mesic	Well	0.6
C.	Blairmore and Morley Foothills ecodistricts (disturbed grasslands)								
C1.	Idaho fescue-Parry oatgrass-Sedge	1432	368	15		1815	Mesic	Well	0.5
C2.	Canada bluegrass-Rough fescue-Slender wheatgrass	1165	671	15		1851	Mesic	Well	0.5
C3.	Kentucky bluegrass-Rough fescue	1961	620	36		2616	Mesic	Well	0.4
C4.	Kentucky bluegrass-Timothy/Dandelion	2096	551	72		2720	Mesic	Well	0.3
C5.	Smooth brome-Kentucky bluegrass					3000*	Mesic	Well	0.4
C6.	Sedge/Little clubmoss-Moss phlox	460	355	67		829	Subxeric	Rapidly	1.1
C7.	Creeping red fescue/Dandelion-Clover	1833	601			1832	Mesic	Well	0.5
C8.	Northern wheatgrass-Kentucky bluegrass	1112	642	82		1836	Submesic	Well	0.5
C9.	Rough fescue-Kentucky bluegrass	1496	662	13		2171	Mesic	Well	0.4
C10.	Rough fescue-Sedge-Brome	2185	136			2321	Mesic	Well	0.4

*estimated production

spruce forests.

The grasslands in the Ya Ha Tinda area of the Banff and Jasper ecodistricts are transitional between the grasslands described in Banff and Jasper National Parks and the grasslands in the Morley and Blairmore Foothills ecodistricts of southern Alberta. Rough fescue is common in the Ya Ha Tinda which gives these grasslands some affinity to the rough fescue dominated grasslands in Southern Alberta. The predominance of junegrass and northern wheatgrass in the Ya Ha Tinda also gives these grasslands some affinity to the grasslands described near Banff and Jasper. The grasslands of the Ya Ha Tinda tend to be dry and well drained. They occur on south and west facing slopes and coarse textured fluvial areas. The dry slopes tend to have a predominance of rough fescue, sedge and junegrass. In contrast the level fluvial areas have a predominance of rough fescue and fringed brome. There are a number of community types in the Ya Ha Tinda that are transitional to the Upper Foothills and Subalpine subregions. These include the Tufted hairgrass-Sedge and Bog birch/Sedge-Rough fescue dominated community types.

Blairmore and Morley Foothills ecodistricts

The dominant grassland community types of these ecodistricts near the Porcupine hills and south into the Castle area are outlined in Figures 1 and 2. The Rough fescue-Idaho fescue-Parry oatgrass dominates mesic to submesic, lower slope positions and terraces with Black Chernozemic soils. Situated upslope from this plant community on slightly drier sites with poorer soils, Parry oatgrass and Idaho fescue replace rough fescue as the dominant grass to form the Idaho fescue-Parry oatgrass-Rough fescue community type. The Bluebunch wheatgrass-Sedge community is found on steep south-facing slopes with Regosolic and Brunisolic soils. Further upslope on dry sandstone outcrops and xeric hillcrests, limber pine dominated community types are very common. A Rough fescue-Sedge/Bearberry-dominated community type is found on hilltops throughout the area. This type tends to be drier than the lower slope dominated rough fescue community type, but it is moister and not as rapidly drained as the Bluebunch wheatgrass-Sedge and limber pine dominated community types. Douglas fir invasion is common on these hilltop community types, to form the Douglas fir/Idaho fescue-Rough fescue and Douglas fir/Idaho fescue-Sandberg bluegrass community types. At higher elevations the ecotone between forest and grassland is dominated by the Snowberry-Rose-Saskatoon/Bearberry community type on drier sites and by the Pinegrass-Hairy wildrye community on moister sites with northerly aspects.

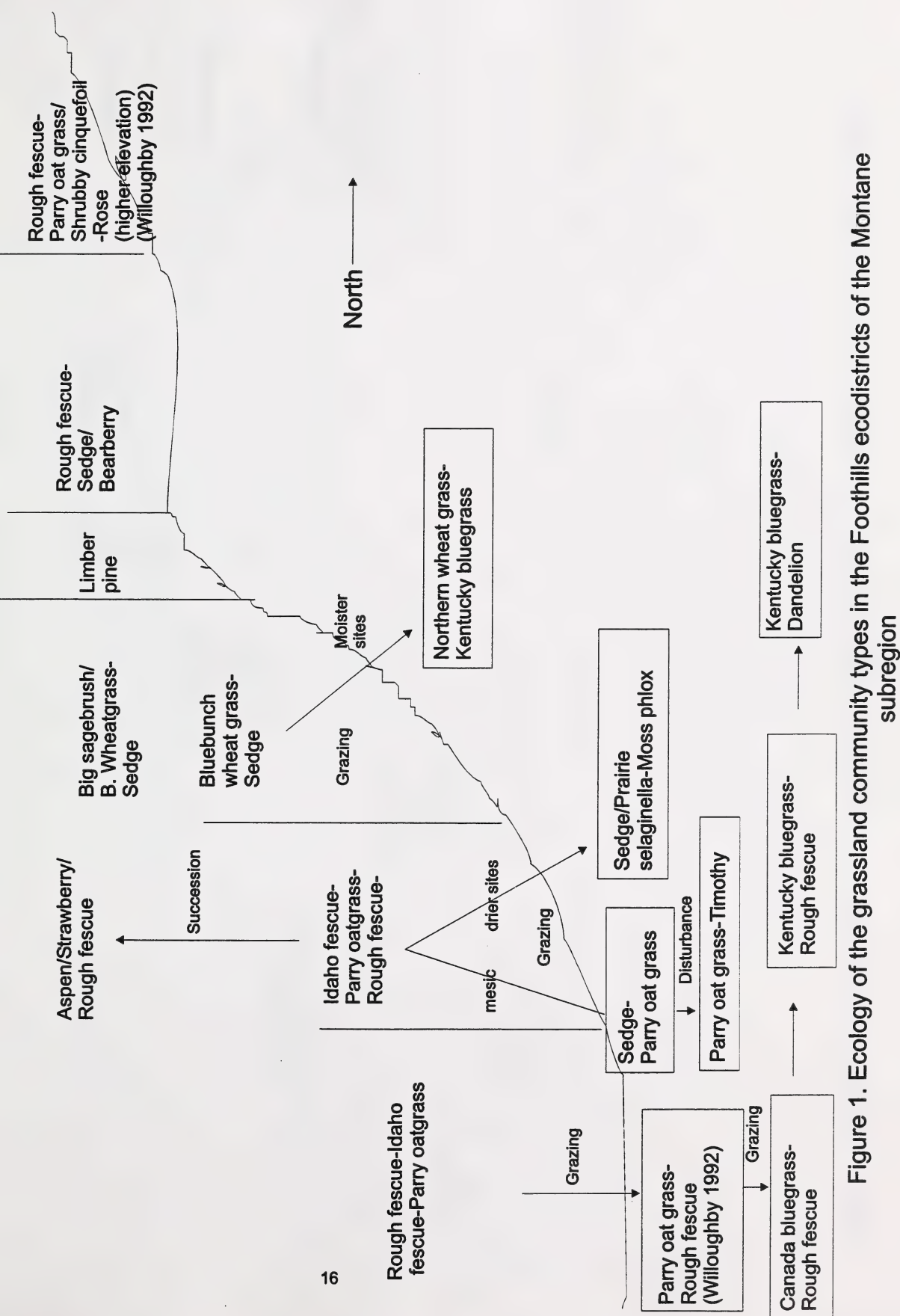
A Big sagebrush/Bluebunch wheatgrass-Sedge community type was described on a gravelly south facing slope south of Blairmore. This community type is rare in Alberta and appears to be an extension of the Palouse prairie from Eastern Washington (Moss 1947).

There are a number of community types that are characteristic of moist, poorly drained, nutrient rich sites. These include Thimbleberry brush, Sedge meadows, Tufted hairgrass-Baltic rush and Forb meadows. The Tufted hairgrass-Baltic rush community has plant species that are more characteristic of the Subalpine subregion (Willoughby and Smith 1997) and may represent the transition to the subalpine.

There are a number of different grassland community types that have been influenced by

grazing pressure. Increased grazing pressure on a rough fescue dominated community type leads to a decline in rough fescue and an increase in Parry oatgrass and Idaho fescue to form the Idaho fescue-Parry oatgrass-Sedge community (Willoughby 1992). Continued heavy grazing pressure allows Kentucky or Canada bluegrass to establish to form the Kentucky bluegrass-Rough fescue or Canada bluegrass-Rough fescue community types. Continued heavy grazing pressure eventually leads to a decline in all native species and the site is dominated by Kentucky bluegrass and dandelion to form the Kentucky bluegrass\Dandelion community type. There are a number of community types that have been seeded to tame forage species through cultivation or reclamation. These include the Smooth brome-Kentucky bluegrass and Creeping red fescue/Dandelion-Clover community types.

On the drier slopes increased grazing pressure on the Idaho fescue-Parry oatgrass-Rough fescue and Bluebunch wheatgrass community types leads to an increase in low growing forbs and graminoids to form the Sedge/Little clubmoss-Moss phlox community type. On moister sites in these community types, grazing disturbance also leads to the formation of Parry oatgrass-Timothy and Northern wheatgrass-Kentucky bluegrass dominated community types.



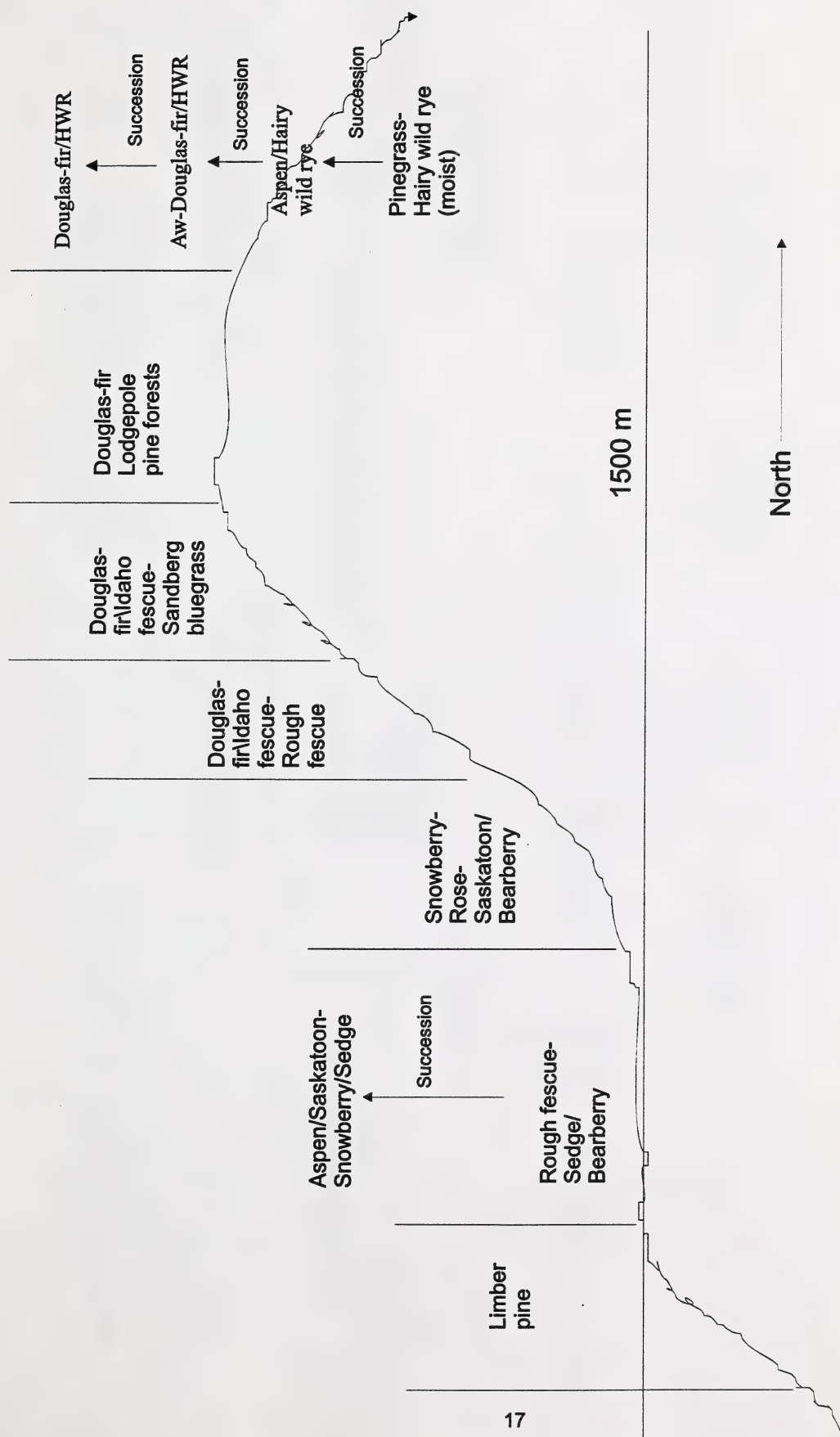
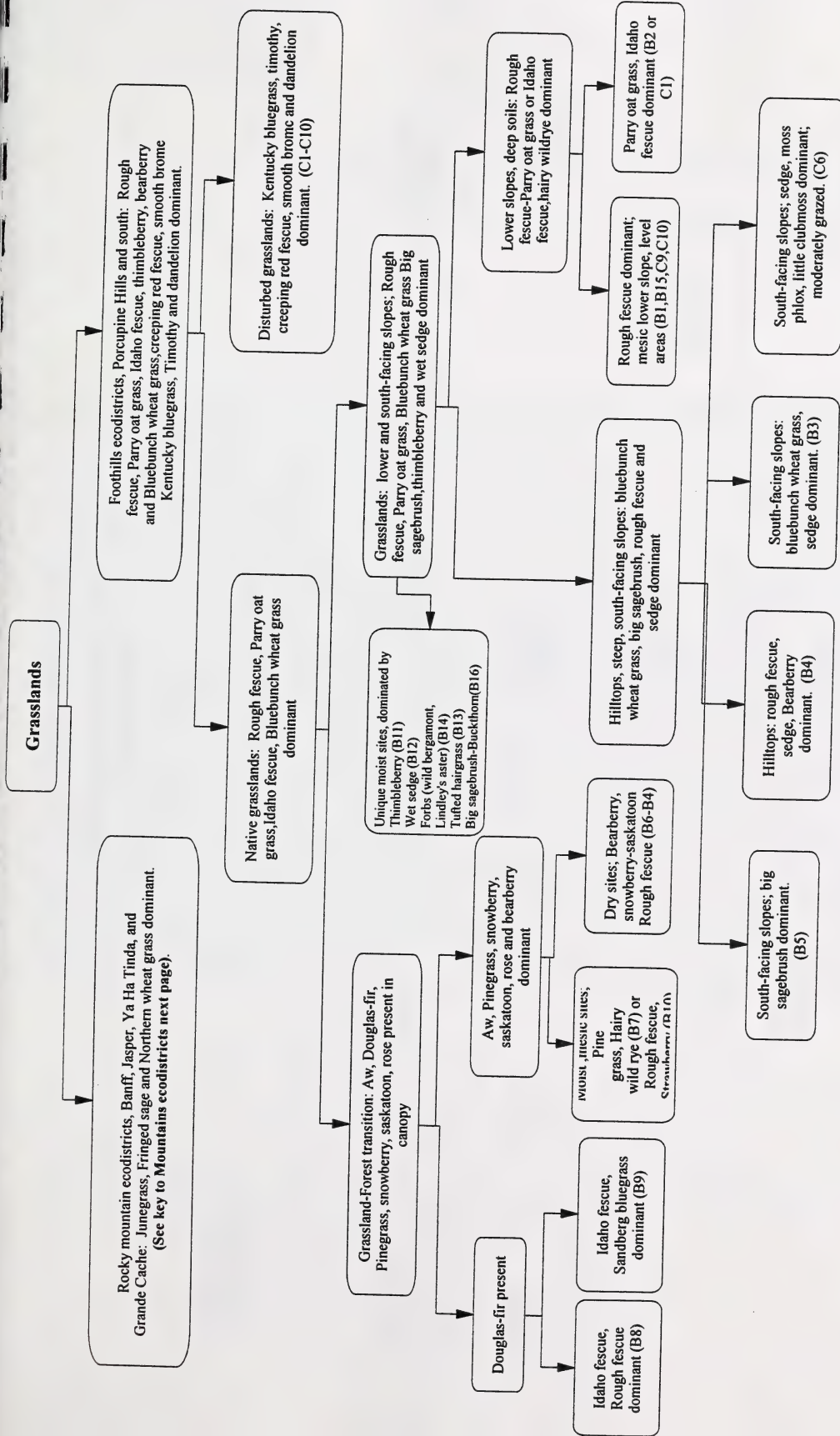
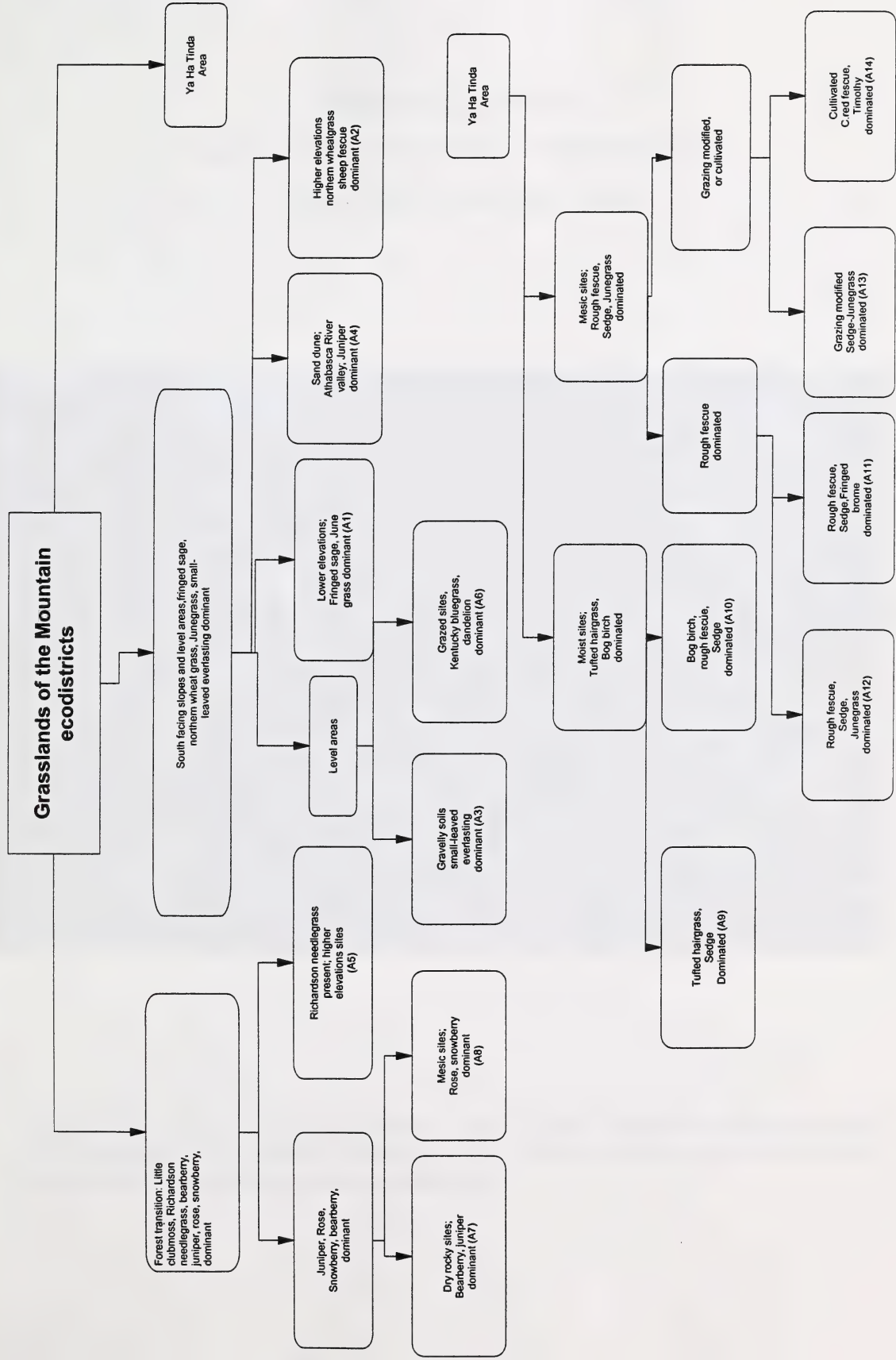


Figure 2. Ecological Sequence of the Grassland-Forest Transition communities in the Montane subregion



Key to Grassland communities of the Montane Subregion



Key to Grassland community types in the Mountain Ecodistricts

MONTANE SUBREGION
BANFF AND JASPER MOUNTAIN ECODISTRICTS
GRASSLAND COMMUNITY TYPES



Photo 2: Banff and Jasper Mountain ecoregions. This is a typical grassland of south-facing slopes in Jasper National Park. The high population of wild ungulates in the National Parks has resulted in heavy use on many of these grassland communities.

A1. Fringed sage/Junegrass (*Artemisia frigida*/Koelera macrantha)

n=11 This community type is typical of steep south facing slopes, at lower elevations in the river valleys near Banff and Jasper. It is similar to the Junegrass-Plains reedgrass community described by Stringer (1973) near Banff and Jasper, the Purple reedgrass/Fringed sage community described by Bailey et al. (1992) in the Yukon and the Fringed sage/Slender wheatgrass community described by Pojar (1982) in Northern British Columbia. The prominent species of these grasslands (junegrass, northern wheatgrass, fringed sage, pussy toes and bearberry) are typical of xerophytic and Mixed Prairie type grasslands throughout Western Canada. The dessicating winds of the area and steep south-facing slopes would contribute to a climate that is similar to the Mixed Prairie subregion (Strong 1992). Grazing has also seemed to have had an influence on this community type. Stringer (1973) felt that with protection from heavy wildlife grazing Plains reedgrass and northern wheatgrass would increase and fringed sage and junegrass would decrease. Bailey et al. (1992), found that fringed sage, pussy toes, bearberry and low growing sedges increased and purple reedgrass declined with increased grazing pressure on the Purple reedgrass/Fringed sage community type. It would appear the dry climate, and heavy grazing pressure by wild ungulates have contributed to the development of this grassland community.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	2
GROUND JUNIPER (<i>Juniperus communis</i>)	2

FORBS

FRINGED SAGE (<i>Artemisia frigida</i>)	11
BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	2
WILD BLUE FLAX (<i>Linum lewisii</i>)	3
SMALL LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	4

GRASSES

HAIRY WILDRYE (<i>Elymus innovatus</i>)	1
JUNEGRASS (<i>Koeleria macrantha</i>)	16
PURPLE REEDGRASS (<i>Calamagrostis purpurascens</i>)	4
NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC-XERIC

NUTRIENT REGIME (MEAN

SUBMESOTROPHIC

ELEVATION:

990-1720(1244) M

SOIL DRAINAGE (MEAN):

WELL TO RAPIDLY

SLOPE (RANGE):

29(2-65)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 250-750 *ESTIMATE

RECOMMENDED STOCKING RATE 4-18 HA/AUM
--

A2. Northern wheatgrass-Sheep fescue

(Agropyron dasystachyum-Festuca saximontana)

n=2 This community type is similar to the Fringed sage/Junegrass community type. It occupies dry, steep, south facing slopes at slightly higher elevations than the Fringed sage/Junegrass community in the river valleys near Banff and Jasper. This community type appears to be in better range condition than the Fringed sage/Junegrass community type. As Stringer (1973) found, when the Fringed sage/Junegrass type was protected from grazing northern wheatgrass increased in cover. The higher elevation of these sites may restrict access to wild ungulate grazing. Consequently, it would appear this community type is not grazed as heavily as the Fringed sage/Junegrass community type.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SASKATOON	
<i>(Amelanchier alnifolia)</i>	4

FORBS

YARROW	
<i>(Achillea millefolium)</i>	3

SMALL LEAVED EVERLASTING	
<i>(Antennaria parviflora)</i>	2

SILKY PERENNIAL LUPINE	
<i>(Lupinus sericeus)</i>	2

GRASSES

HAIRY WILD RYE	
<i>(Elymus innovatus)</i>	5

NORTHERN WHEATGRASS	
<i>(Agropyron dasystachyum)</i>	34

SHEEP FESCUE	
<i>(Festuca saximontana)</i>	2

JUNEGRASS	
<i>(Koeleria macrantha)</i>	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBXERIC

NUTRIENT REGIME (MEAN):
SUBMESOTROPHIC

ELEVATION:
1220-1859(1561) M

SOIL DRAINAGE (MEAN):
RAPIDLY

SLOPE (RANGE):
34(5-65)%

ASPECT:
SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+STD. DEV.)

TOTAL 400 *ESTIMATE

SUGGESTED STOCKING RATE
4 HA/AUM

A3. Small-leaved everlasting/Junegrass

(*Antennaria parviflora*/*Koeleria macrantha*)

n=2 The two stands described in this community type are from dry, level areas in the Athabasca and North Saskatchewan river valleys near Jasper and Saskatchewan crossing. They are similar to the Fringed sage/Junegrass community type, but lack cover of fringed sage. Small leaved everlasting is known to be well adapted to xeric moisture conditions (Moss 1992) and is known to increase with increased grazing pressure (Stringer 1973, Bailey et al. 1992). Presently, it is not clear why fringed sage is absent from these sites.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL.
(*Potentilla fruticosa*) 1

FORBS

SMALL LEAVED EVERLASTING
(*Antennaria parviflora*) 18

ALPINE MILK VETCH
(*Astragalus alpinus*) 8

GRACEFUL CINQUEFOIL
(*Potentilla fruticosa*) 1

FRINGED SAGE
(*Artemisia frigida*) 1

GRASSES

JUNEGRASS
(*Koeleria macrantha*) 3

NORTHERN WHEATGRASS
(*Agropyron trachycaulum*) 1

UPLAND SEDGE
(*Carex spp.*) 1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

XERIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC

ELEVATION:

1000-1380(1160) M

SOIL DRAINAGE (MEAN):

RAPIDLY

SLOPE(RANGE):

1(0-2)%

ASPECT:

SOUTH TO WESTERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 250 *ESTIMATE

SUGGESTED STOCKING RATE
18 HA/AUM

A4. Juniper/Northern wheatgrass-Columbia needlegrass

(*Juniperus horizontalis*/*Agropyron trachycaulum*-*Stipa columbiana*)

n=2 This community type is distinguished from the other grassland community types in the Banff and Jasper river valleys by the presence of a high juniper cover. It occupies lower elevation, steep, xeric slopes with Regosolic and eolian soils. This community type often occurs in association with dense white spruce thickets which occur in mesic depressions between the sand dunes (Corns and Achuff 1982).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

PRICKLY ROSE (<i>Rosa acicularis</i>)	1
CREeping JUNIPER (<i>Juniperus horizontalis</i>)	16
GROUND JUNIPER (<i>Juniperus communis</i>)	4

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	3
SMALL-LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	8
ASCENDING PURPLE MILK VETCH (<i>Astragalus striatus</i>)	5
PRAIRIE GROUNDSEL (<i>Senecio canus</i>)	5
GAILLARDIA (BROWN-EYED SUSAN) (<i>Gaillardia aristata</i>)	3

GRASSES

NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	4
COLUMBIA NEEDLEGRASS (<i>Stipa columbiana</i>)	8
SHEEP FESCUE (<i>Festuca saximontana</i>)	4
RUSH LIKE SEDGE (<i>Carex scirpoides</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

XERIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC

ELEVATION:

1050-1410(1285) M

SOIL DRAINAGE (MEAN):

RAPIDLY

SLOPE (RANGE):

39(30-48)%

ASPECT:

SOUTH TO WEST

PARENT MATERIAL:

AEOLIAN

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 250 *ESTIMATE

SUGGESTED STOCKING RATE
18 HA/AUM

A5. Little clubmoss/Richardson needlegrass (*Selaginella densa*/*Stipa richardsonii*)

n=1 This community type is representative of small isolated, south facing slopes within the pine-spruce-fir forests. Stringer (1973), described a similar community at higher elevations near Banff and Jasper. Stringer felt this grassland was unrelated to any grasslands in Western North America and thus seemed to be a distinct grassland type characteristic of the moister sites in the Fescue prairies-coniferous forest ecotone of Banff and Jasper.

PLANT COMPOSITION CANOPY COVER(%)

FORBS

LITTLE CLUBMOSS (<i>Selaginella densa</i>)	15
SMALL- LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	8
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	5
TUFTED FLEABANE (<i>Erigeron caespitosus</i>)	5
NODDING ONION (<i>Allium cernuum</i>)	2
SMALL FLOWERED BEARDSTONGUE (<i>Penstemon procerus</i>)	2

GRASSES

RICHARDSON NEEDLEGRASS (<i>Stipa richardsonii</i>)	8
PURPLE REEDGRASS (<i>Calamagrostis purpurascens</i>)	2
JUNEGRASS (<i>Koeleria macrantha</i>)	2
NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	1

LICHEN

5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC (4)

ELEVATION:

1330 M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE:

15%

ASPECT:

SOUTHWEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 385 *ESTIMATE

SUGGESTED STOCKING RATE
2.4 HA/AUM

A6. Kentucky bluegrass-Junegrass/Dandelion

(*Poa pratensis*-*Koeleria macrantha*/*Taraxacum officinale*)

n=3 This community type was described on lower to level slope positions, with submesic to mesic moisture regimes. The presence of a high cover of Kentucky bluegrass is indicative of the heavy grazing influence on this community type. On mesic to subhygric sites in the fescue grasslands heavy grazing pressure is known to cause a decline in native grass species allowing Kentucky bluegrass to increase (Willoughby 1992). The presence of Junegrass indicates that this community has some affinity with the Fringed sage/Junegrass community found in the same area. In the absence of grazing this community type may resemble a Rough fescue/Upland sedge community described on hill crests in the Porcupine hills (Willoughby 1992).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
CREEPING JUNIPER (<i>Juniperus horizontalis</i>)	2

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	3
DANDELION (<i>Taraxacum officinale</i>)	2
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	1
ASCENDING PURPLE MILK VETCH (<i>Astragalus striatus</i>)	5
LATE YELLOW LOCOWEED (<i>Oxytropis monticola</i>)	3

GRASSES

KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	33
JUNEGRASS (<i>Koeleria macrantha</i>)	14
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	2
PARRY OATGRASS (<i>Danthonia parryii</i>)	2
COLUMBIA NEEDLEGRASS (<i>Stipa columbiana</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC

ELEVATION:

1110 - 1495 (1328) M

SOIL DRAINAGE (MEAN):

WELL

SLOPE (RANGE):

7(0-21)

ASPECT:

SOUTH

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1500 *ESTIMATE

SUGGESTED STOCKING RATE 0.6 HA/AUM

A7. Bearberry/Juniper

(*Arctostaphylos uva-ursi*/*Juniperus spp.*)

n=17 This community type represents the forest-grassland ecotone on dry, rocky south facing slopes throughout the Banff and Jasper river valleys. Indeed many of the stands described in this community type were placed into douglas fir and spruce forest types described by Corns and Achuff (1982). Sundquist et al. (1996), described a similar community type Low northern sedge/Bearberry on rocky hilltops in the Lower Foothills subregion near Hinton.

PLANT COMPOSITION CANOPY COVER(%)

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	6
LODGEPOLE PINE (<i>Pinus contorta</i>)	2

SHRUBS

JUNIPER (<i>Juniperus communis</i> , <i>J. horizontalis</i>)	8
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	6
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	4

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	33
WHITE CAMAS (<i>Zigadenus elegans</i>)	3
SMALL LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	1

GRASSES

RUSH LIKE SEDGE (<i>Carex scirpoidea</i>)	3
HAIRY WILD RYE (<i>Elymus innovatus</i>)	3
JUNEGRASS (<i>Koeleria macrantha</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

XERIC TO SUBXERIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC

ELEVATION:

1000-1630(1273) M

SOIL DRAINAGE (MEAN):

WELL TO RAPIDLY

SLOPE (RANGE):

28(0-68)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 500* *ESTIMATE

SUGGESTED STOCKING RATE

NON-USE

A8. Rose-Snowberry

(*Rosa acicularis*-*Symphoricarpos occidentalis*)

n=6 This community type represents the forest-grassland ecotone on south facing slopes in both the Mountain and Foothills ecodistricts. This community type is moister and has better developed soils than the Bearberry/Juniper community type. This community type appears to be undergoing transition to a deciduous dominated forest. Many of the dominant understory species (rose, strawberry, northern bedstraw, tall lungwort and hairy wildrye) are all characteristic of deciduous stands (Willoughby and Downing 1995).

PLANT COMPOSITION CANOPY COVER(%)

TREES

WHITE SPRUCE
(*Picea glauca*) 1

BALSAM POPLAR
(*Populus balsamifera*) 1

SHRUBS

PRICKLY ROSE
(*Rosa acicularis*) 23

SNOWBERRY
(*Symphoricarpos occidentalis*) 22

BUFFALOBERRY
(*Shepherdia canadensis*) 1

SASKATOON
(*Amelanchier alnifolia*) 3

FORBS

BEARBERRY
(*Arctostaphylos uva-ursi*) 1

NORTHERN BEDSTRAW
(*Galium boreale*) 2

WILD STRAWBERRY
(*Fragaria virginiana*) 12

TALL LUNGWORT
(*Mertensia paniculata*) 1

LINDLEY'S ASTER
(*Aster ciliolatus*) 3

WINTERGREEN
(*Pyrola asarifolia*) 4

GRASSES

HAIRY WILDRYE
(*Elymus imrovatus*) 12

MARSH REEDGRASS
(*Calamagrostis canadensis*) 3

TWO SEEDED SEDGE
(*Carex disperma*) 3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC-MESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC

ELEVATION:

1070-1539(1308) M

SOIL DRAINAGE (MEAN):

WELL

SLOPE (RANGE):

26(0-65)%

ASPECT:

SOUTHWEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 750 *ESTIMATE

SUGGESTED STOCKING RATE
3 HA/AUM

MONTANE SUBREGION
BANFF AND JASPER MOUNTAIN ECODISTRICTS
YA HA TINDA AREA



Photo 3: Banff and Jasper Mountain ecoregions. This is a typical grassland of south-facing slopes and meadows in the Ya Ha Tinda. These grasslands are transitional between the grasslands described in Banff and Jasper National Parks and the Morley and Blairmore Foothills ecoregions.

A9. Tufted hairgrass-Sedge

(*Deschampsia cespitosa*-*Carex praegracilis*)

n=1 This community type is located on moist sites that are better drained than pure sedge meadows. Willoughby (1992) and Willoughby and Smith (1997), found that tufted hairgrass is a common plant species on these lowland sites throughout the Upper Foothills and lower Subalpine subregions. The presence of this community type in the Ya Ha Tinda indicates that many of the grasslands in this area are transitional to the Upper Foothills and Subalpine subregions. Morgantini and Russell (1983), found that elk preferred the rough fescue dominated areas over these tufted hairgrass dominated communities at Ribbon flats just west of the Ya Ha Tinda. As a result this community type would be rated as secondary or non-use range for elk and horses in the Ya Ha Tinda area.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
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FORBS

GRACEFUL CINQUEFOIL (<i>Potentilla gracilis</i>)	8
YARROW (<i>Achillea millefolium</i>)	3
CHICKWEED (<i>Cerastium arvense</i>)	2
ELEPHANT'S HEAD (<i>Pedicularis groenlandica</i>)	2

GRASSES

GRACEFUL SEDGE (<i>Carex praegracilis</i>)	39
TUFTED HAIRGRASS (<i>Deschampsia cespitosa</i>)	12
SEDGE SPP. (<i>Carex spp.</i>)	9
HAIRY WILDRYE (<i>Elymus innovatus</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBHYGRIC

NUTRIENT REGIME (MEAN)

PERMESOTROPHIC

ELEVATION:

1650 M

SOIL DRAINAGE (MEAN):

WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS 1208

FORB 98

TOTAL 1256

RECOMMENDED STOCKING RATE (HORSES) 1.1HA/AUM

A10. Bog birch/Sedge-Rough fescue

(*Betula glandulosa*/*Carex spp.*-*Festuca scabrella*)

n=1 This community type represents the invasion of bog birch onto the rough fescue grasslands. This community type is found scattered throughout the grasslands in the Ya Ha Tinda on slightly moister sites. It also appears to be transitional to many of the forested stands in the area. This community type is very similar to the Bog birch/Rough fescue community type described by Willoughby and Smith (1997) in the Upper Foothills subregion. They felt that the lack of fire on this community type allowed bog birch cover to expand, reducing forage productivity for wildlife and domestic livestock. In one study, burning bog birch twice in 3 year intervals controlled birch growth and increased total forage production by over 40% compared to the unburned control (Bork 1990).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

BOG BIRCH	
(<i>Betula glandulosa</i>)	30
SHRUBBY CINQUEFOIL	
(<i>Potentilla fruticosa</i>)	7

FORBS

YARROW	
(<i>Achillea millefolium</i>)	3
SMALL LEAVED EVERLASTING	
(<i>Antennaria parviflora</i>)	2
CUT LEAVED ANEMONE	
(<i>Anemone multifida</i>)	4
HEART LEAVED ALEXANDERS	
(<i>Zizia aptera</i>)	4
OLD MAN'S WHISKERS	
(<i>Geum triflorum</i>)	3
AMERICAN VETCH	
(<i>Vicia americana</i>)	3

GRASSES

SEDGE SPP.	
(<i>Carex spp.</i>)	12
ROUGH FESCUE	
(<i>Festuca scabrella</i>)	2
SHEEP FESCUE	
(<i>Festuca sacimontana</i>)	4
JUNEGRASS	
(<i>Koeleria macrantha</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
MESIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC

ELEVATION:
1476 M

SOIL DRAINAGE (MEAN):
WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS	592
FORB	198
SHRUB	12
TOTAL	802

SUGGESTED STOCKING RATE(HORSES)
1.7 HA/AUM

A11. Rough fescue-Fringed brome-Sedge

(*Festuca scabrella*-*Bromus ciliatus*-*Carex spp.*)

n=5 This community type represents coarse textured fluvial areas and moister south and west facing slopes. The increased moisture on these spots favours the growth of fringed brome. On the drier south and west facing slopes these grasslands are dominated by rough fescue, sedge and junegrass. The forage production on this community type tends to be slightly higher than the Rough fescue-Sedge-Junegrass dominated community type. Making this community type one of the most important foraging areas for wildlife. The rough fescue grasslands in the Ya Ha Tinda area are extensively utilized by elk and domestic horses. It is not clear how this heavy grazing pressure has affected the species composition of these grasslands. It is likely that rough fescue cover would increase if the grazing pressure was reduced on these grasslands (Willoughby 1992).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL.
(*Potentilla fruticosa*) 2

FORBS

EARLY YELLOW LOCOWEED
(*Oxytropis sericea*) 7
SMALL LEAVED EVERLASTING
(*Antennaria parviflora*) 1
OLD MAN'S WHISKERS
(*Geum triflorum*) 10
ALPINE HEDYSARUM
(*Hedysarum alpinum*) 3
YARROW
(*Achillea millefolium*) 3
SHOWY LOCOWEED
(*Oxytropis splendens*) 2
CUT LEAVED ANEMONE
(*Anemone multifida*) 2

GRASSES

JUNEGRASS
(*Koeleria macrantha*) 3
FRINGED BROME
(*Bromus ciliatus*) 10
THREAD-LEAVED SEDGE
(*Carex filifolia*) 9
ROUGH FESCUE
(*Festuca scabrella*) 8

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC-SUBMESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC

ELEVATION:

1600-1700(1640) M

SOIL DRAINAGE (MEAN):

RAPIDLY

SLOPE(RANGE):

6(0-20)%

ASPECT:

SOUTH TO WESTERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS 802(560-1006)
FORB 322(130-674)
SHRUB 82(0-350)
TOTAL 1207(804-1740)

SUGGESTED STOCKING RATE(HORSES)
1.1 HA/AUM

A12. Rough fescue-Sedge-Junegrass

(*Festuca scabrella*-*Carex filifolia*-*Koeleria macrantha*)

n=2 This community type is distinguished from the other rough fescue dominated community type by the lack of fringed brome and the increased cover of junegrass. This community type tends to occupy steeper, morainal and colluvial slopes and has a drier moisture regime than the previously described rough fescue community type. Morgantini and Russell (1983) found that the rough fescue dominated community types were the primary foraging areas for elk. As a result this community type should be rated as primary range. The rough fescue grasslands in the Ya Ha Tinda area are extensively utilized by elk and domestic horses. It is not clear how this heavy grazing pressure has affected the species composition of these grasslands. It is likely rough fescue cover would increase if the grazing pressure was reduced on these grasslands (Willoughby 1992).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	3
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FORBS

EARLY YELLOW LOCOWEED (<i>Oxytropis sericea</i>)	10
SMALL-LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	1
OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	6
FALSE DANDELION (<i>Agoseris glauca</i>)	1
WOOLLY EVERLASTING (<i>Antennaria lanata</i>)	3

GRASSES

NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	3
JUNEGRASS (<i>Koeleria macrantha</i>)	7
ROUGH FESCUE (<i>Festuca scabrella</i>)	13
SEDGE (<i>Carex spp.</i>)	5
HAIRY WILDRYE (<i>Elymus innovatus</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC-SUBMESOTROPHIC

ELEVATION:

1600-1650(1625) M

SOIL DRAINAGE (MEAN):

RAPIDLY

SLOPE (RANGE):

23(10-35)%

ASPECT:

SOUTH TO WEST

PARENT MATERIAL:

MORAINAL, COLLUVIAL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+STD. DEV.)

GRASS	584(514-654)
FORB	228(156-300)
SHRUB	69(24-114)
TOTAL	881(834-928)

SUGGESTED STOCKING RATE(HORSES) 1.5 HA/AUM
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A13. Sedge-Junegrass (*Carex filifolia*-*Koeleria macrantha*)

n=2 This community type was described on the west side of the Ya Ha Tinda ranch. It is closer to the ranch buildings and therefore is more extensively utilized by horses. It was described on coarse textured fluvial areas. The parent material and ecological conditions are similar to the Rough fescue-Fringed brome-Sedge dominated community type. It appears that the heavier grazing pressure on this community type causes rough fescue to decline and allows sedge and junegrass to increase. The forage production on this community type is about half of the rough fescue dominated community types, indicating that some type of rest would benefit this grassland.

PLANT COMPOSITION CANOPY COVER(%)

SHRUB	
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	8
FORBS	
EARLY YELLOW LOCOWEED (<i>Oxytropis sericera</i>)	2
SMALL- LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	1
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	3
SHOWY LOCOWEED (<i>Oxytropis splendens</i>)	3
FRINGED SAGE (<i>Artemisia frigida</i>)	1
WHITE CAMAS (<i>Zigadenus elegans</i>)	1
GRASSES	
SEDGE SPP. (<i>Carex spp.</i>)	6
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	3
JUNEGRASS (<i>Koeleria macrantha</i>)	5
SHEEP FESCUE (<i>Festuc saximontana</i>)	3
LICHEN	7

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC
NUTRIENT REGIME (MEAN): SUBMESOTROPHIC
ELEVATION: 1474-1480(1477) M
SOIL DRAINAGE (MEAN): RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS	451 (90-884)
FORB	71(2-200)
SHRUB	5(2-10)
TOTAL	520(292-906)

SUGGESTED STOCKING RATE(HORSES)
2.6 HA/AUM

A14. Creeping red fescue-Timothy

(*Festuca rubra*-*Phleum pratense*)

n=2 This community type represents spruce cutblocks that were harvested and seeded to creeping red fescue and timothy. This seeding was done in order to increase the forage supply for wintering elk and alleviate the pressure on the rough fescue dominated grasslands around the Ya Ha Tinda ranch. This seeding has increased the forage supply of the area, but it has been found that elk do not prefer to graze these sites. The agronomic species seeded into these cutblocks have also been found to be invasive (Gerling et al. 1996). Further range improvement should probably be done with a native seed mix.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS		
	WILLOW SPP. (<i>Salix spp.</i>)	2
FORBS		
	TALL LARKSPUR (<i>Delphinium glaucum</i>)	1
	FIREWEED (<i>Epilobium angustifolium</i>)	2
GRASSES		
	KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	2
	CREEPING RED FESCUE (<i>Festuca rubra</i>)	18
	HAIRY WILDRYE (<i>Elymus innovatus</i>)	10
	TIMOTHY (<i>Phleum pratense</i>)	8
	SEDGE SPP. (<i>Carex spp.</i>)	6

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
MESIC
NUTRIENT REGIME (MEAN):
MESOTROPHIC
ELEVATION:
1565-1620(1593) M
SOIL DRAINAGE (MEAN):
WELL
SLOPE (RANGE):
40(35-45) M
ASPECT:

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1500

SUGGESTED STOCKING RATE(HORSES)
0.9 HA/AUM

**MONTANE SUBREGION
BLAIRMORE AND MORLEY FOOTHILLS ECODISTRICTS
GRASSLAND COMMUNITY TYPES**



Photo 4. Blairmore Foothills ecodistrict: This represents a Rough fescue-Sedge/Bearberry grassland found on a wind-swept, steep, south-facing slope where the moisture regime is submesic to subxeric. The harsh environmental conditions favour the growth of Limber pine.



Photo 5. Blairmore Foothills ecodistrict: This is a moderately-grazed Idaho fescue-Parry oatgrass-Rough fescue grassland. This community type is highly diverse as a result of light to moderate grazing. Under long-term, heavy grazing, diversity would decline as Kentucky bluegrass and dandelion became the dominant species.

B1. Rough fescue-Idaho fescue-Parry oatgrass

(*Festuca scabrella*-*Festuca idahoensis*-*Danthonia parryi*)

n=90 This community appears to be the modal grassland community type on Black Chernozemic soils in the foothills of southern Alberta from an elevation of 1300m up to 1900m on isolated sites. Willoughby (1992), described one Rough fescue-dominated site where the species composition had not changed in over 30 years, indicating this maybe the climax community type on river terraces and south facing slopes in the Montane. Indeed Moss and Campbell (1947), found that rough fescue grows almost to the exclusion of other plants in the absence of disturbance. On rocky and gravelly slopes with shallow soils, rough fescue is replaced by Parry oatgrass and Idaho fescue. They also found Parry oatgrass and Idaho fescue increased and rough fescue declined with increased grazing pressure. Willoughby (1992), also described rough fescue and Idaho fescue dominated community types with little Parry oatgrass in the Castle area south of Blairmore. He also found that rose and shrubby cinquefoil tended to increase in cover at higher elevations in these grasslands. In this guide it was difficult and impractical to distinguish these community types. Consequently, the Rough fescue, Rough fescue-Idaho fescue and Rough fescue-Parry oatgrass/Shrubby cinquefoil-Rose community types listed in Willoughby (1992) are grouped into this one large community type.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	3
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FORBS

OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	4
YELLOW BEARDTONGUE (<i>Penstemon confertus</i>)	4
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	2
WOOLY GROMWELL (<i>Lithosperma ruderale</i>)	1
STICKY PURPLE GERANIUM (<i>Geranium viscosissimum</i>)	2
MOUNTAIN SHOOTING STAR (<i>Dodecatheon conjugens</i>)	1

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	29
IDAHO FESCUE (<i>Festuca idahoensis</i>)	9
PARRY OATGRASS (<i>Danthonia parryi</i>)	10
BLUNT SEDGE (<i>Carex obtusata</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC-MESIC(4.4)

NUTRIENT REGIME (MEAN

SUBMESOTROPHIC-PERMESOTROPHIC(3.2)

ELEVATION:

1370-2121(1606)M

SOIL DRAINAGE (MEAN):

WELL TO MODERATELY WELL

SLOPE (RANGE):

16 (0-60)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 1424(568-2940)

FORB 527(0-1612)

SHRUB 25(0-924)

TOTAL 1928(924-3201)

RECOMMENDED STOCKING RATE 0.5 HA/AUM

B2. Idaho fescue-Parry oatgrass-Rough fescue

(*Festuca idahoensis*-*Danthonia parryi*-*Festuca scabrella*)

n=35 This community type is found upslope from the Rough fescue-Parry oatgrass-Idaho fescue community type (Figure 1) and can be dominated by Idaho fescue or Parry oatgrass. As one moves upslope to drier conditions there is a shift in species composition from rough fescue to Parry oatgrass and Idaho fescue. Under grazing pressure Parry oatgrass, Idaho fescue and rough fescue decline and upland sedge increases (Willoughby 1992). On drier sites within this community type juniper and bearberry cover can be extensive. Increased grazing pressure on the drier sites will lead to an increase in low growing forbs (little clubmoss, moss phlox) and sedges.

This particular community type has a stocking rate of 0.6 ha/AUM, based on 50% of the grass production.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	2
PRICKLY ROSE (<i>Rosa acicularis</i>)	2

FORBS

YARROW (<i>Achillea millefolium</i>)	2
OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	3
SILKY PERENNIAL LUPINE (<i>Lupinus sericeus</i>)	4
WOOLY GROMWELL (<i>Lithosperma ruderale</i>)	1
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	3

GRASSES

PARRY OATGRASS (<i>Danthonia parryi</i>)	17
ROUGH FESCUE (<i>Festuca scabrella</i>)	10
IDAHO FESCUE (<i>Festuca idahoensis</i>)	17
BLUNT SEDGE (<i>Carex obtusata</i>)	3
JUNEGRASS (<i>Koeleria macrantha</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC-SUBMESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC

ELEVATION:

1350-1848(1560) M

SOIL DRAINAGE (MEAN):

RAPIDLY-WELL

SLOPE (RANGE):

21(0-36)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS 1208(252-2026)

FORB 350(10-838)

TOTAL 1578(640-2446)

SUGGESTED STOCKING RATE
0.6 HA/AUM

B3. Bluebunch wheatgrass-Sedge

(*Agropyron spicatum*-*Carex obtusata*)

n=26 Bluebunch wheatgrass dominated sites are found on well-drained, south facing-slopes in the Montane subregion throughout southern Alberta (Strong 1992). This dominant species is abundant in the interior of southern British Columbia, where it is codominant with big sagebrush (*Artemisia tridentata*) at lower elevations and rough fescue at higher elevations (Tisdale 1947). Increased grazing pressure on the drier sites leads to a decline in bluebunch wheatgrass and allows low growing forbs and sedge species to increase. On sites with big sagebrush in British Columbia bluebunch wheatgrass decreases and big sagebrush will increase with increased grazing pressure (Tisdale 1947). Forage production on this type can vary from 700 kg/ha on dry sites to over 1600 kg/ha on moister sites. One site that had been invaded by timothy produced over 5000 kg/ha (Bluebunch wheatgrass-Timothy community type).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SASKATOON	
(<i>Amelanchier alnifolia</i>)	8
WESTERN SNOWBERRY	
(<i>Symphoricarpos occidentalis</i>)	8

FORBS

YELLOW BEARDSTONGUE	
(<i>Penstemon confertus</i>)	1
SILKY PERENNIAL LUPINE	
(<i>Lupinus sericeus</i>)	4
COMMON STRAWBERRY	
(<i>Fragaria virginiana</i>)	2
BEARBERRY	
(<i>Arctostaphylos uva-ursi</i>)	5
FRINGED SAGE	
(<i>Artemisia frigida</i>)	3

GRASSES

JUNEGRASS	
(<i>Koeleria macrantha</i>)	9
NORTHERN WHEATGRASS	
(<i>Agropyron dasystachyum</i>)	1
BLUNT SEDGE	
(<i>Carex obtusata</i>)	3
BLUEBUNCH WHEATGRASS	
(<i>Agropyron spicatum</i>)	17
ROUGH FESCUE	
(<i>Festuca scabrella</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC-SUBMESIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC-MESOTROPHIC

ELEVATION:

1394-1848(1635) M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE(RANGE):

43(0-65)%

ASPECT:

SOUTH TO WESTERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 513 (1)

FORB 1119 (1)

TOTAL 1632 (1)

SUGGESTED STOCKING RATE

0.6 HA/AUM

B4. Rough fescue-Sedge/Bearberry

(*Festuca scabrella*-*Carex obtusata*/*Arctostaphylos uva-ursi*)

n=42 This community appears to be characteristic of dry grass meadows on hilltops throughout the Montane subregion. It is similar to the Rough fescue-Sedge community type described by Willoughby (1992) on hilltops in the Porcupine Hills. The shallow poorly developed soils appear to favour rough fescue, slender wheatgrass and sedge over Parry oatgrass. This community is drier than the Rough fescue grasslands characteristic of lower slope positions, but is moister than the bluebunch wheatgrass plant community that is associated with dry southerly slopes. This community type can be invaded by aspen to form the Aspen/Saskatoon/Sedge, PI/Bearberry-Juniper or Fd/Hairy wildrye community types. The transition community between the forest and grassland may resemble the Pinegrass-Hairy wildrye or Snowberry-Rose-Saskatoon/Bearberry community types.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

PRICKLY ROSE (<i>Rosa acicularis</i>)	1
CREeping JUNIPER (<i>Juniperus horizontalis</i>)	2
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	1
SASKATOON (<i>Amelanchier alnifolia</i>)	3

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	33
FRINGED SAGE (<i>Artemisia frigida</i>)	1
MOSS PHLOX (<i>Phlox hoodii</i>)	1
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	3
STRAWBERRY (<i>Fragaria virginiana</i>)	4

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	24
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	3
JUNEGRASS (<i>Koeleria macrantha</i>)	3
BLUNT SEDGE (<i>Carex obtusata</i>)	4
IDAHO FESCUE (<i>Festuca idahoensis</i>)	5
PARRY OATGRASS (<i>Danthonia parryi</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

XERIC-MESIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC-MESOTROPHIC

ELEVATION:

1341-2134(1679) M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE (RANGE):

27(0-58)%

ASPECT:

SOUTH TO WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+STD. DEV.)(N)

GRASS 1010(404-2184)

FORB 571(82-1174)

SHRUB 227(0-1192)

TOTAL 1730(600-3086)

SUGGESTED STOCKING RATE
0.5 HA/AUM

B5. Big sagebrush/Bluebunch wheatgrass-Sedge

(*Artemisia tridentata*/*Agropyron spicatum*-*Carex spp.*)

n=4 This community type is rare in Alberta and is isolated on gravelly south facing slopes in the Montane subregion south of Blairmore. This community type is similar to the Pacific Northwest Bunchgrass type described by Tisdale (1982) in Washington and British Columbia. The big sagebrush, bluebunch wheatgrass community types found in these areas are located on Dark Brown and Dk Gray Chernozemic soils, with glacial till parent material (Green and van Ryswyk 1982). Tisdale (1982), found that there is little known about the environmental factors which determine the presence of sagebrush-grass versus true grassland. Therefore, it is not clear why these south facing slopes are dominated by sagebrush and not a bluebunch wheatgrass community type. It is known that increased grazing pressure on a Big sagebrush/Bluebunch wheatgrass in British Columbia will allow big sagebrush to increase in cover, but heavy grazing pressure does not seem to be a factor in the formation of this community type in Alberta.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

BIG SAGEBRUSH
(*Artemisia tridentata*) 26

FORBS

LITTLE CLUBMOSS
(*Selaginella densa*) 5

BEARBERRY
(*Arctostaphylos uva-ursi*) 36

SMALL-LEAVED EVERLASTING
(*Antennaria parviflora*) 2

NODDING ONION
(*Allium cernuum*) 1

STICKY ALUMROOT
(*Heuchera cylindrica*) 1

SILKY PERENNIAL LUPINE
(*Lupinus sericeus*) 3

GRASSES

NORTHERN WHEATGRASS
(*Agropyron dasystachyum*) 1

BLUEBUNCH WHEATGRASS
(*Agropyron spicatum*) 9

IDAHO FESCUE
(*Festuca idahoensis*) 11

JUNEGRASS
(*Koeleria macrantha*) 4

BLUNT SEDGE
(*Carex obtusata*) 1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBXERIC-MESIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC (2)

ELEVATION:

1580-1680(1630) M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE:

39(35-40)%

ASPECT:

SOUTH AND WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 500 *ESTIMATE

SUGGESTED STOCKING RATE
1.8 HA/AUM

B6. Snowberry-Rose-Saskatoon/Bearberry

(*Symphoricarpos occidentalis*-*Rosa acicularis*-*Amelanchier alnifolia*/*Arctostaphylos uva-ursi*)

n=55 This community type represents the ecotone between rough fescue dominated grasslands and Douglas fir and lodgepole pine dominated forests on dry south facing slopes. The presence of shrubs (saskatoon, rose, snowberry) and the grass species (hairy wildrye, pinegrass) indicate the transition from rough fescue grasslands to a forested community type. This community type appears to occur at higher elevations (>1500m) and may reflect the dominance of trees at the higher altitudes. Forage production declines rapidly moving from the grassland into the forests. This community type has half the production (1100 kg/ha) of rough fescue dominated grasslands (2200 kg/ha). The increase in tree canopy cover results in a further decline in forage production to approximately 600 kg/ha.

PLANT COMPOSITION CANOPY COVER(%)

TREES

ASPEN
(*Populus tremuloides*) 3

SHRUBS

SHRUBBY CINQUEFOIL
(*Potentilla fruticosa*) 2
CREEPING JUNIPER
(*Juniperus horizontalis*) 1
SNOWBERRY
(*Symphoricarpos occidentalis*) 3
SASKATOON
(*Amelanchier alnifolia*) 6
PRAIRIE ROSE , PRICKLY ROSE
(*Rosa arkansana*, *R. acicularis*) 5

FORBS

BEARBERRY
(*Arctostaphylos uva-ursi*) 14
SILKY PERENNIAL LUPINE
(*Lupinus sericeus*) 3
CUT LEAVED ANEMONE
(*Anemone multifida*) 2
SMOOTH ASTER
(*Aster laevis*) 2
STRAWBERRY
(*Fragaria virginiana*) 4

GRASSES

ROUGH FESCUE
(*Festuca scabrella*) 6
JUNEGRASS
(*Koeleria macrantha*) 5
BLUNT SEDGE
(*Carex obtusata*) 8
HAIRY WILDRYE

(*Elymus innovatus*) 2
PINEGRASS
(*Calamagrostis rubescens*) 4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
XERIC-SUBMESIC
NUTRIENT REGIME (MEAN):
SUBMESOTROPHIC-MESOTROPHIC
ELEVATION:
1557(1350-1981) M
SOIL DRAINAGE (MEAN):
VERY RAPIDLY TO WELL
SLOPE (RANGE):
32(0-77)%
ASPECT:
SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)
GRASS 795(268-1214)
FORB 364(0-1068)
SHRUB 127(0-196)
TOTAL 1287(1038-1500)

SUGGESTED STOCKING RATE
0.7 HA/AUM

B7. Pinegrass-Hairy wildrye/Strawberry

(*Calamagrostis rubescens*-*Elymus innovatus*/*Fragaria virginiana*)

n=11 This community type represents the transition from grassland to forest on moist sites with northerly aspects. It appears this community occurs in areas that have some seepage throughout the growing season. There is usually high forb cover on these sites with strawberry, showy aster, american vetch, peavine and silky perennial lupine being common. Pinegrass and hairy wildrye are the common grass species in the understory of conifer and deciduous stands and their dominance in this community type may indicate a transition to a forested community. The high moisture content of these sites allows for production of over 2000 kg/ha.

PLANT COMPOSITION CANOPY COVER(%)

TREES	
ASPEN	
(<i>Populus tremuloides</i>)	T
SHRUBS	
DWARF BILBERRY	
(<i>Vaccinium caespitosum</i>)	1
SNOWBERRY	
(<i>Symphoricarpos occidentalis</i>)	2
PRICKLY ROSE	
(<i>Rosa acicularis</i>)	2
WHITE MEADOWSWEET	
(<i>Spiraea betulifolia</i>)	2
FORBS	
STRAWBERRY	
(<i>Fragaria virginiana</i>)	13
YELLOW PEAVINE	
(<i>Lathyrus ochroleucus</i>)	4
SILKY PERENNIAL LUPINE	
(<i>Lupinus sericeus</i>)	5
SHOWY ASTER	
(<i>Aster conspicuus</i>)	5
GRASSES	
PINEGRASS	
(<i>Calamagrostis rubescens</i>)	23
HAIRY WILD RYE	
(<i>Elymus innovatus</i>)	7
NORTHERN AWNLESS BROME	
(<i>Bromus pumpeilianus</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):	
MESIC-SUBHYGRIC	
NUTRIENT REGIME (MEAN):	
MESOTROPHIC-PERMESOTROPHIC	
ELEVATION:	
1364-1640(1514) M	
SOIL DRAINAGE (MEAN):	
WELL TO MODERATELY WELL	
SLOPE (RANGE):	
20(0-46)%	
ASPECT:	
NORTHERLY, WEST, EAST	

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)	
GRASS	1487(1058-1916)
FORB	1003(858-1148)
TOTAL	2260(1800-3064)

SUGGESTED STOCKING RATE 0.4 HA/AUM

B8.Douglas fir/Idaho fescue-Rough fescue

(*Pseudotsuga menziesii*/*Festuca idahoensis*-*Festuca scabrella*)

n=3 This community type represents the transition from grassland to a Douglas fir dominated forest. The factors responsible for the differences between forest and grassland maybe climatic, with cooler and moister conditions favouring forest, it could be edaphic with grasslands found on drier and shallower soils or lack of disturbance from fire which favours the growth of trees. Extensive overlap of the forests and grassland will occur in the Montane because of the variable soils and topography.

PLANT COMPOSITION CANOPY COVER(%)

TREES

DOUGLAS FIR (<i>Pseudotsuga menziesii</i>)	10
LODGEPOLE PINE (<i>Pinus contorta</i>)	2

SHRUBS

PRICKLY ROSE (<i>Rosa acicularis</i>)	1
SNOWBERRY (<i>Symphoricarpos albus</i>)	1
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	1
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	7

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	2
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	2
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	2
SILKY PERENNIAL LUPINE (<i>Lupinus sericeus</i>)	7
BALSAMROOT (<i>Balsamorhiza sagittata</i>)	2

GRASSES

IDAHO FESCUE (<i>Festuca idahoensis</i>)	42
ROUGH FESCUE (<i>Festuca scabrella</i>)	33
PINEGRASS (<i>Calamagrostis rubescens</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBMESIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC

ELEVATION:
1554-1680(1602) M

SOIL DRAINAGE (MEAN):
WELL

SLOPE (RANGE):
12(0-30)%

ASPECT:
SOUTHWEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE 0.5 HA/AUM
--

(*Pseudotsuga menziesii*/*Festuca idahoensis*-*Poa sandbergii*)

n=1 This community type is similar to the Douglas fir/Idaho fescue-Rough fescue community type and represents the transition from grassland to forest, but this type is drier and has shallower soils than the Douglas fir/Idaho fescue-Rough fescue community type. Little clubmoss, fringed sage, Sandberg bluegrass and junegrass are all well adapted to dry, rapidly drained sites. Johnston (1981), described a Sandberg bluegrass/Bluebunch wheatgrass type on dry sites with extremely shallow soils in Oregon and Tisdale (1982) described Sandberg bluegrass on dry sites with fine textured soils in British Columbia. It is also possible that increased grazing pressure may also account for the high cover of Sandberg bluegrass. Mueggler and Stewart (1980), found Sandberg bluegrass increased with grazing pressure on dry grasslands in Montana.

PLANT COMPOSITION CANOPY COVER(%)

TREES

DOUGLAS FIR
(*Pseudotsuga menziesii*) 7

SHRUBS

PRICKLY ROSE
(*Rosa acicularis*) 2

CREEPING JUNIPER
(*Juniperus communis*) 1

WHITE MEADOWSWEET
(*Spiraea betulifolia*) 2

FORBS

LITTLE CLUBMOSS
(*Selaginella densa*) 5

DANDELION
(*Taraxacum officinale*) 3

WILD STRAWBERRY
(*Fragaria virginiana*) 2

CUT LEAVED ANEMONE
(*Anemone multifida*) 2

BALSAMROOT
(*Balsamorhiza sagitata*) 2

GRASSES

IDAHO FESCUE	
<i>(Festuca idahoensis)</i>	30

SANDBERG BLUEGRASS
(*Poa sandbergii*) 30

JUNEGRASS	
(<i>Koeleria macrantha</i>)	10

BLUEBUNCH WHEATGRASS
(*Agropyron spicatum*) 5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBMESIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC

ELEVATION:
1554-1680(1602) M

SOIL DRAINAGE (MEAN):
WELL

SLOPE (RANGE):
12(0-30)

ASPECT:
SOUTHWEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE
0.5 HA/AUM

B10. Aw/Strawberry/Rough fescue

(*Populus tremuloides*/*Fragaria virginiana*/*Festuca scabrella*)

n=1 This community type represents the transition from a rough fescue dominated grassland to an aspen dominated forest. Aspen has invaded onto the grassland and the species composition of the understory is slowly succeeding to species characteristic of aspen stands such as strawberry and slender wheatgrass.

This community type is much moister than the Douglas fir transition forests previously described. Aspen favors the moist draws and north-facing slopes throughout the foothills of southern Alberta. As one moves west into the mountains and the Subalpine subregion, aspen tends to grow very poorly, and the aspen stands are characterized by stunted, twisted trees that have low vigour. Forage production on the grasslands declines rapidly when aspen invades; from a high of 2000 kg/ha to a low of 1000 kg/ha.

PLANT COMPOSITION CANOPY COVER(%)

TREES

ASPEN
(*Populus tremuloides*) 5

SHRUBS

PRICKLY ROSE
(*Rosa acicularis*) 1

FORBS

STRAWBERRY
(*Fragaria virginiana*) 17

DANDELION
(*Taraxacum officinale*) 1

STICKY PURPLE GERANIUM
(*Geranium viscosissimum*) 5

GRACEFUL CINQUEFOIL
(*Potentilla gracilis*) 6

CANADA THISTLE
(*Cirsium arvense*) 7

GRASSES

ROUGH FESCUE
(*Festuca scabrella*) 25

FOWL BLUEGRASS
(*Poa palustris*) 41

GREEN NEEDLEGRASS
(*Stipa viridula*) 15

RICHARDSON NEEDLEGRASS
(*Stipa richardsonii*) 9

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBHYGRIC

NUTRIENT REGIME (MEAN):
EUTROPHIC

ELEVATION:
1585 M

SOIL DRAINAGE (MEAN):
MODERATELY WELL

SLOPE (RANGE):
12

ASPECT:
SOUTH

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE
0.5 HA/AUM

B11. Thimbleberry

(*Rubus parviflorus*)

n=3 This community type is characteristic of nutrient-rich seepage areas throughout the Montane. This community is very similar to the Aw-Pb/Thimbleberry and Lodgepole pine/Thimbleberry community types described later in the guide, but it is not as successional advanced.

Forage production of this community type is very high because of the high moisture and nutrient content of the soil, but the thick cover of thimbleberry which is generally unpalatable to livestock at proper stocking levels limits access. As a result this community type would be rated as non-use range.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

THIMBLEBERRY	
(<i>Rubus parviflorus</i>)	58

FORBS

STRAWBERRY	
(<i>Fragaria virginiana</i>)	10
LINDLEY'S ASTER	
(<i>Aster ciliolatus</i>)	6
SHOWY ASTER	
(<i>Aster conspicuus</i>)	7
FIREWEED	
(<i>Epilobium angustifolium</i>)	4
BANEERRY	
(<i>Actaea rubra</i>)	3

GRASSES

PINEGRASS	
(<i>Calamagrostis rubescens</i>)	9
FOWL BLUEGRASS	
(<i>Poa palustris</i>)	1
FRINGED BROME	
(<i>Bromus ciliatus</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBHYGRIC

NUTRIENT REGIME (MEAN):
PERMESOTROPHIC

ELEVATION:
1640(1500-1860)M

SOIL DRAINAGE (MEAN):
MODERATELY WELL

SLOPE (RANGE):
35(10-50)%

ASPECT:
VARIABLE

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS	2190
FORB	256
SHRUB	186
TOTAL	2632

SUGGESTED STOCKING RATE 0.7 HA/AUM

B12. Sedge meadows

(*Carex rostrata*, *C. aquatilis*)

n=3 This community type is found in all subregions of Alberta. Wet conditions and periodic flooding result in the formation of sedge meadows. Bog birch and willow will invade into the drier edges of these meadows to form the Willow/Sedge and Bog birch /Sedge community types.

These community types are quite productive producing nearly 2000 kg/ha of forage, but the high water table in the spring and summer when these meadows are most palatable limits livestock use. A study in the Yukon found that crude protein on these meadows declined from a high of 10% in May to less than 5% in September (Bailey et al. 1992). As a result, these meadows would be rated as secondary or non-use range.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

WILLOW SPP. (<i>Salix spp.</i>)	1
--------------------------------------	---

FORBS

PURPLE AVENS (<i>Geum rivale</i>)	5
SMOOTH ASTER (<i>Aster laevis</i>)	3
SWAMP HORSETAIL (<i>Equisetum fluviatile</i>)	4
FIREWEED (<i>Epilobium angustifolium</i>)	1

GRASSES

BEAKED SEDGE (<i>Carex rostrata</i>)	43
FOWL BLUEGRASS (<i>Poa palustris</i>)	7
BALITIC RUSH (<i>Juncus baliticus</i>)	9
MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	6

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
HYGRIC-SUBHYDRIC

NUTRIENT REGIME (MEAN):
PERMESOTROPHIC

ELEVATION:
1485(1469-1500) M

SOIL DRAINAGE (MEAN):
IMPERFECTLY, POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE 0.5 HA/AUM

B13. Tufted hairgrass-Baltic rush

(*Deschampsia cespitosa*-*Juncus baliticus*)

n=1 This community type is very similar to the tufted hairgrass-dominated communities described in the Upper foothills and Subalpine subregions of northern Alberta (Willoughby and Smith 1997) and may indicate the transition from the Montane to the Subalpine subregion in southern Alberta. This community is located on moist sites that are better drained and slightly drier than the pure sedge meadows. When this community is protected from grazing and fire for 25-40 years willow and bog birch expand and tufted hairgrass and sedge decline. The decline in graminoid cover causes a decline in available forage production.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL
(*Potentilla fruticosa*) 19

FORBS

OLD MAN'S WHISKERS
(*Geum triflorum*) 21

SMOOTH-LEAVED CINQUEFOIL
(*Potentilla diversifolia*) 19

VEINY MEADOW RUE
(*Thalictrum venulosum*) 8

YELLOW BEARDSTONGUE
(*Penstemon confertus*) 4

GRASSES

TUFTED HAIRGRASS
(*Deschampsia cespitosa*) 24

IDAHO FESCUE
(*Festuca idahoensis*) 25

BALTIC RUSH
(*Juncus baliticus*) 26

SLENDER WHEATGRASS
(*Agropyron trachycaulum*) 12

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
HYGRIC

NUTRIENT REGIME (MEAN):
PERMESOTROPHIC

ELEVATION:
1509 M

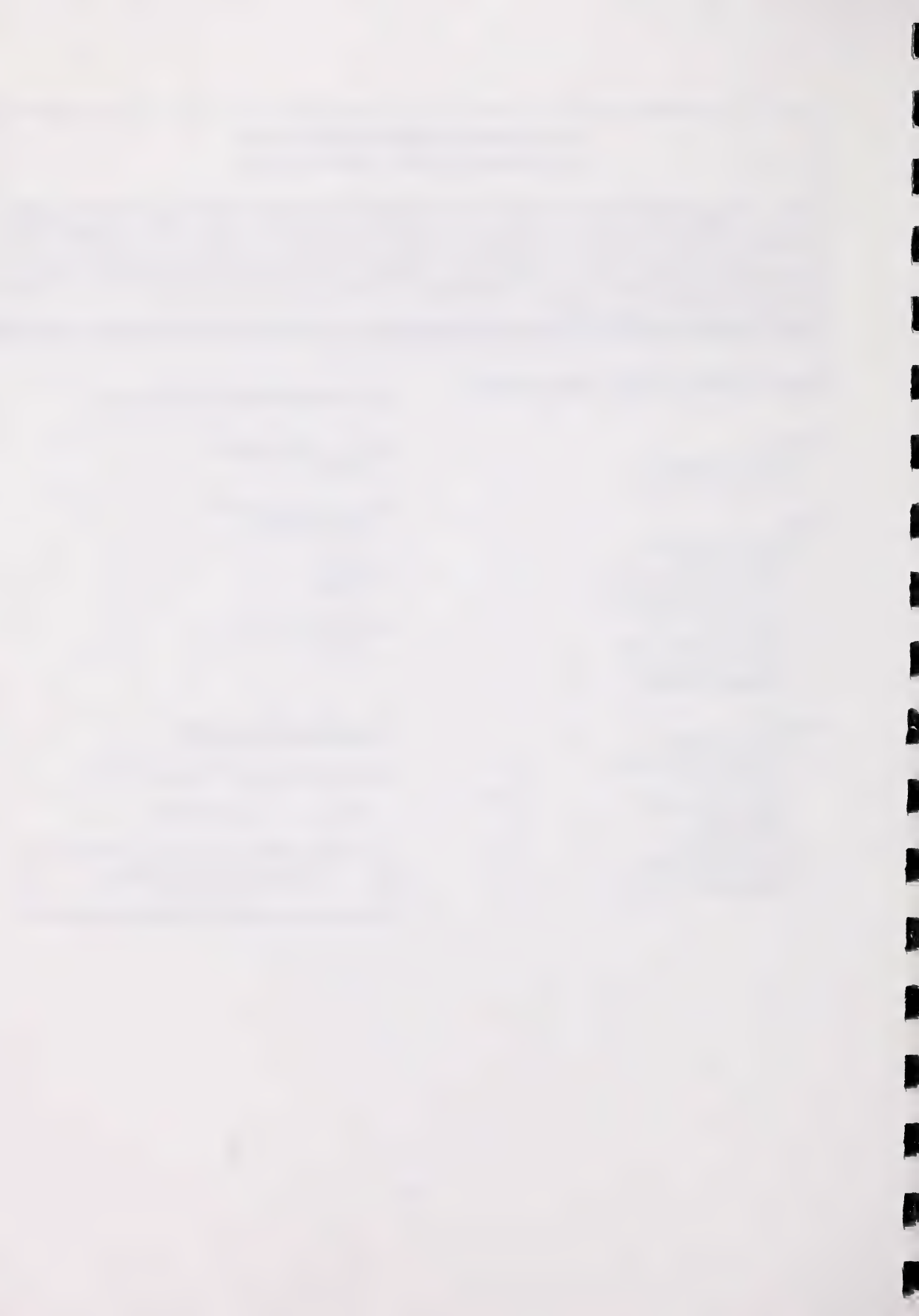
SOIL DRAINAGE (MEAN):
POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE
0.5 HA/AUM



B14. Forb meadows

(*Aster ciliolatus*, *Monarda fistulosa*, *Smilacina stellata*)

n=2 This community type represents small isolated forest openings that are dominated by forbs. The sites tend to be moist, moderately well drained and probably have some nutrient seepage at some time in the year. These meadows can be dominated by Lindley's aster, wild bergamont, snowberry, or star flowered solomon's seal. The grass layer is generally poorly developed which makes this community type hard to group with any of the grassland community types.

The forage production of this community type is generally quite high because of the higher moisture and nutrient content of the soil, but the areas are so small and isolated they contribute little to the overall carrying capacity of a disposition.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	13
PRICKLY ROSE (<i>Rosa acicularis</i>)	1

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	5
STAR FLOWERED SOLOMON'S SEAL (<i>Smilacina stellata</i>)	6
WILD BERGAMONT (<i>Monarda fistulosa</i>)	15
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	15
YELLOW PEAVINE (<i>Lathyrus ochroleucus</i>)	3
YELLOW COLUMBINE (<i>Aquilegia flavescens</i>)	4

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	5
IDAHO FESCUE (<i>Festuca idahoensis</i>)	6
PARRY OATGRASS (<i>Danthonia parryi</i>)	5
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
MESIC-SUBHYGRIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC-PERMESOTROPHIC

ELEVATION:
1565(1450-1680)M

SOIL DRAINAGE (MEAN):
WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

TOTAL 1750 *ESTIMATE

SUGGESTED STOCKING RATE
0.5 HA /AUM

B15. Rough fescue-Hairy wildrye

(*Festuca scabrella*-*Elymus innovatus*)

n=1 This community type was described on the east slopes of the Livingstone range and appears to represent a transitional community from the lower Montane subregion to the higher Subalpine region. Indeed Willoughby and Smith (1997) described a Rough fescue-Hairy wildrye community type in the southern subalpine. They felt that as one moved upslope there would be a shift in codominance of sedge to hairy wildrye and an increase in cover of bearberry and juniper. Corns and Achuff (1982), described hairy wildrye dominated community types on south facing slopes in the more northern ecodistricts of the subalpine. They felt these grasslands occurred on areas with frequent snow avalanching. It is possible that this community type is associated with deeper snow accumulation than the other rough fescue dominated types.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	13
PRICKLY ROSE (<i>Rosa acicularis</i>)	3

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	2
OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	14
YELLOW HEDYSARUM (<i>Hedysarum sulphurescens</i>)	8
MOUNTAIN SHOOTING STAR (<i>Dodecatheon conjugens</i>)	4
YELLOW PEAVINE (<i>Lathyrus ochroleucus</i>)	1
HEART LV'D ALEXANDER (<i>Zizia aptera</i>)	2

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	20
IDAHO FESCUE (<i>Festuca idahoensis</i>)	7
PARRY OATGRASS (<i>Danthonia parryi</i>)	8
HAIRY WILDRYE (<i>Elymus innovatus</i>)	14

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
MESIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC

ELEVATION:
1606 M

SOIL DRAINAGE (MEAN):
WELL

SLOPE:
10%

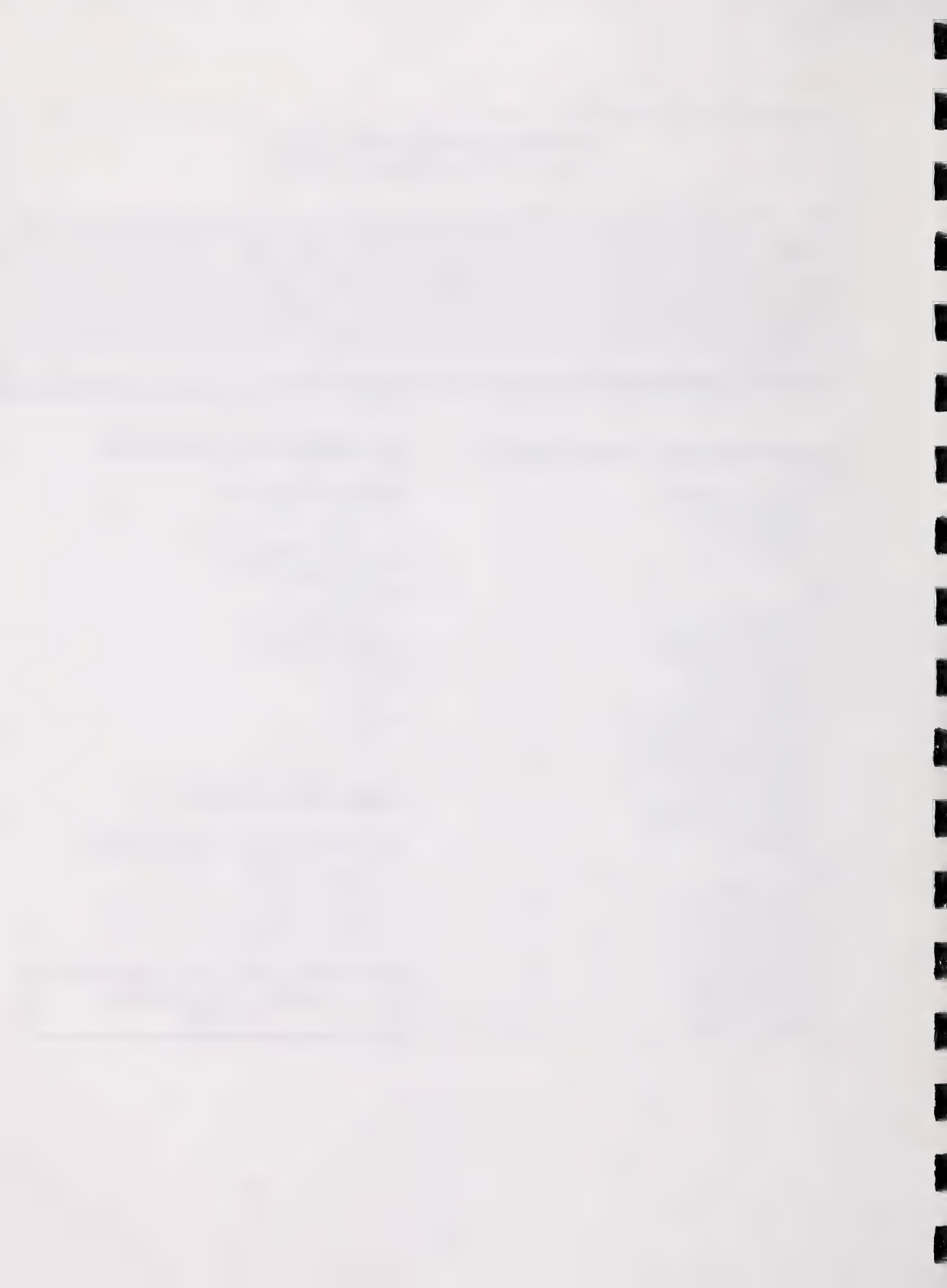
ASPECT:
EAST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+STD. DEV.)

GRASS	1580
FORB	598
SHRUB	44
TOTAL	2222

SUGGESTED STOCKING RATE
0.4 HA/AUM



B16. Big sagebrush-Buckthorn/Kentucky bluegrass

(*Artemisia tridentata*-*Rhamnus alnifolia*/*Poa pratensis*)

n=2 This community type was described on the valley bottoms and meadows adjacent to the South Castle river. Buckthorn tends to grow in the moist areas of the meadows which have fine textured soils. In contrast big sagebrush is found on the drier, gravelly soils of old creek beds. These meadows have been extensively utilized by livestock and recreationists which has allowed Kentucky bluegrass, timothy and dandelion to become established in the understory of these shrub species. It is difficult to determine what the understory vegetation was prior to disturbance. Ernst (1996) (personal communication) felt this site was probably dominated by rough fescue, but the presence of dark scaled sedge and graceful sedge appear to indicate a higher moisture regime than rough fescue-dominated communities. The establishment of an enclosure to protect the site from disturbance may help to answer this question.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

BIG SAGEBRUSH (<i>Artemisia tridentata</i>)	19
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	18
BUCKTHORN (<i>Rhamnus alnifolia</i>)	7

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	6
YELLOW BEARDSTONGUE (<i>Penstemon confertus</i>)	30
YARROW (<i>Achillea millefolium</i>)	9
STAR FLW'D SOLOMON'S SEAL (<i>Smilacina stellata</i>)	3
DANDELION (<i>Taraxacum officinale</i>)	3
HEART LV'D ALEXANDER (<i>Zizia aptera</i>)	T

GRASSES

KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	25
TIMOTHY (<i>Phleum pratense</i>)	10
DARK SCALED SEDGE (<i>Carex atrosquama</i>)	T
GRACEFUL SEDGE (<i>Carex praegracilis</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

MESIC-SUBHYGRIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC-PERMESOTROPHIC

ELEVATION:

1440 M

SOIL DRAINAGE (MEAN):

WELL TO MODERATELY WELL

SLOPE:

1%

ASPECT:

WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS 1000

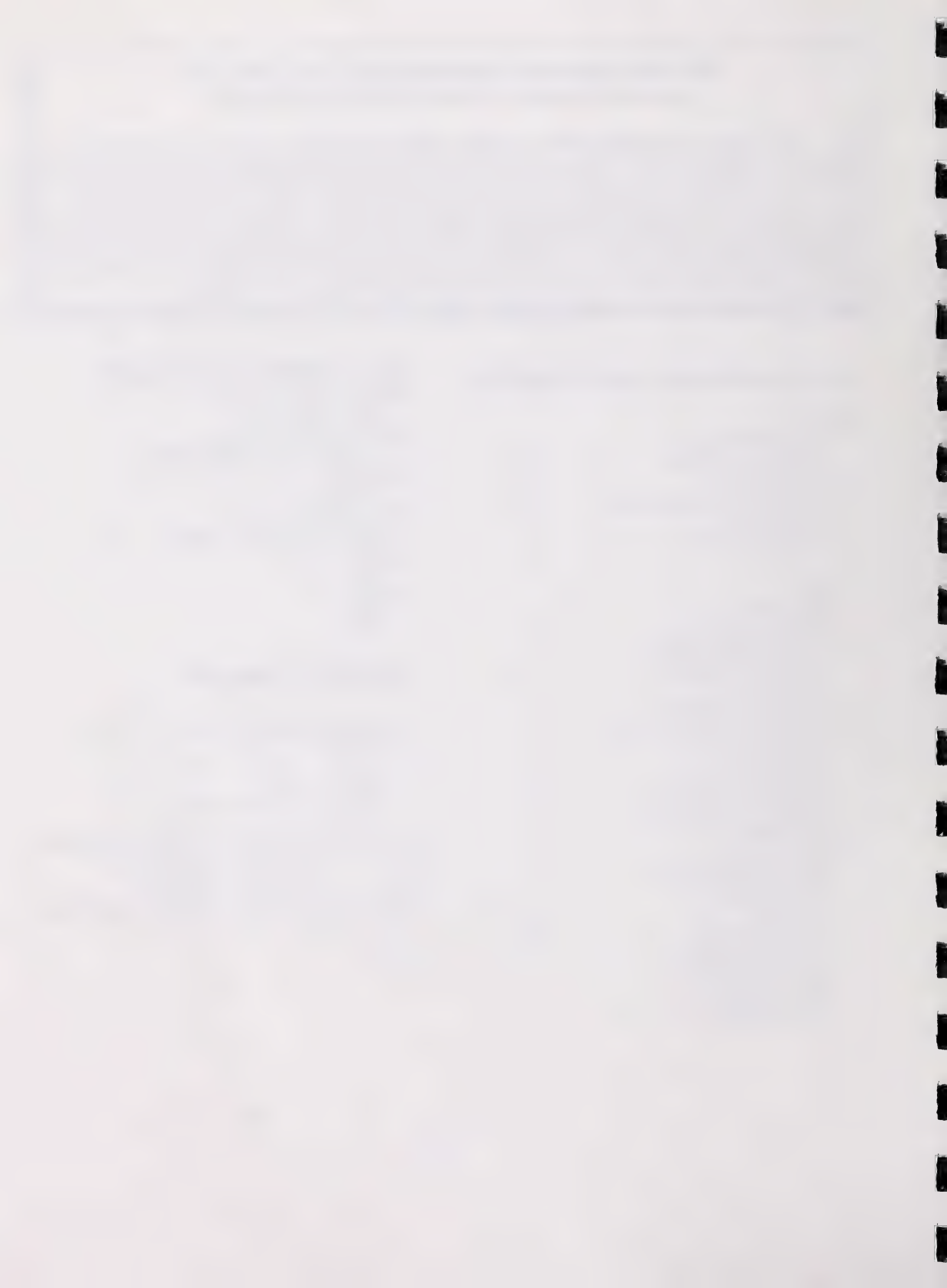
FORB 500

SHRUB 400

TOTAL 1900 *ESTIMATE

SUGGESTED STOCKING RATE

0.6 HA/AUM *ESTIMATE



MONTANE SUBREGION
BLAIRMORE AND MORLEY FOOTHILLS ECODISTRICTS
DISTURBED GRASSLAND COMMUNITY TYPES

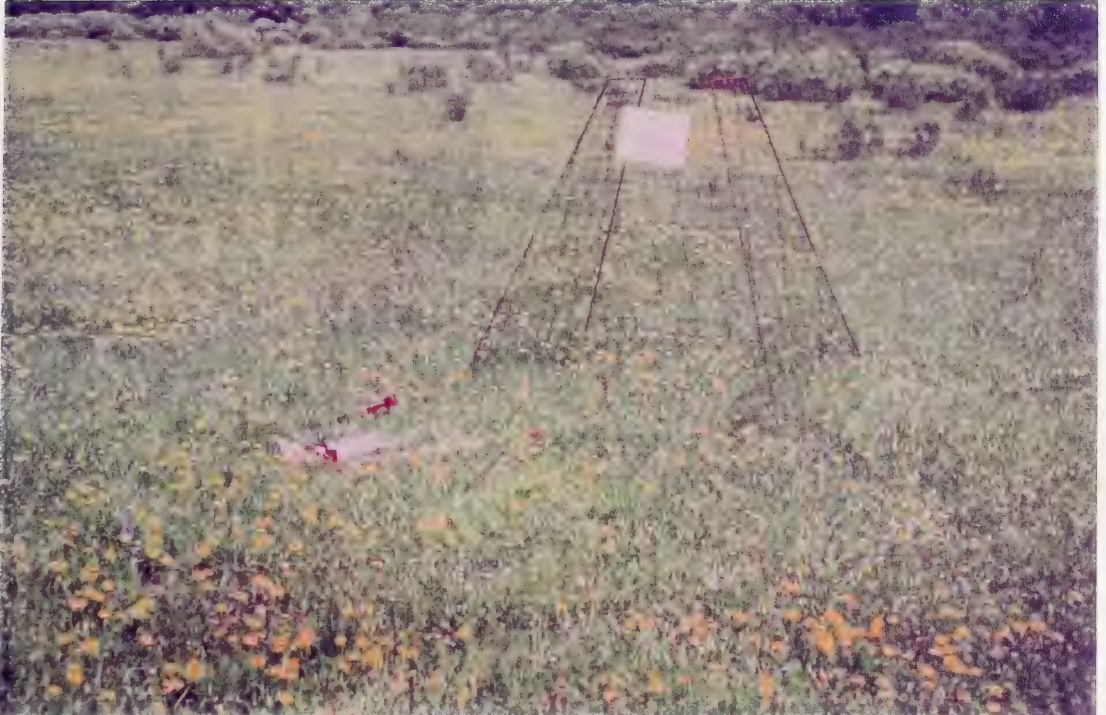


Photo 6: The dominance of Kentucky bluegrass, dandelion and clover indicate that this is an overgrazed grassland. Once Kentucky bluegrass has established dominance, the site will not return to the original vegetation composition when protected from grazing. Instead it will move to another community type, dominated by Kentucky bluegrass and native species such as rough fescue.

C1. Idaho fescue-Parry oatgrass-Sedge (*Festuca idahoensis*-*Danthonia parryi*-*Carex obtusata*)

n=29 This community type represents a Rough fescue-Idaho fescue-Parry oatgrass plant community that has been moderately to heavily grazed for a number of years. The species composition of this community is very similar to the Idaho fescue-Parry oatgrass-Rough fescue community types, but this community type occupies lower slope positions, whereas the latter community occupies mid to upper slope positions.

Increased grazing pressure causes rough fescue to decline and allows Idaho fescue, Parry oatgrass and sedge species to increase. Continued heavy grazing pressure will eventually lead to a decline in all native species and Kentucky bluegrass and dandelion will dominate the site. If grazing pressure on this community type is reduced or is eliminated the type will likely succeed back to a rough fescue dominated grassland. However, if the present grazing pressure continues Kentucky bluegrass will likely dominate the site. Recovery of this grassland back to a rough fescue dominated community type will likely take 20-30 years (Willoughby 1996).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
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FORBS

OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	5
COMMON YARROW (<i>Achillea millefolium</i>)	3
DANDELION (<i>Taraxacum officinale</i>)	1
GRACEFUL CINQUEFOIL (<i>Potentilla gracilis</i>)	1
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	3

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	5
IDAHO FESCUE (<i>Festuca idahoensis</i>)	17
PARRY OATGRASS (<i>Danthonia parryi</i>)	9
BLUNT SEDGE (<i>Carex obtusata</i>)	7
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	7

ENVIRONMENTAL VARIABLE

MOISTURE REGIME (MEAN):

SUBMESIC-MESIC(4.4)

NUTRIENT REGIME (MEAN)

SUBMESOTROPHIC TO MESOTROPHIC(3.2)

ELEVATION:

1491(1330-1920) M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE (RANGE):

9(0-30)%

ASPECT:

SOUTH AND WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 1354(582-2796)

FORB 403(0-588)

SHRUB 8(0-78)

TOTAL 1759(838-2154)

RECOMMENDED STOCKING RATE 0.5 HA/AUM

MEMORANDUM FOR THE RECORD

DATE: 10/10/54

TO: Mr. Tolson, Mr. Boardman, Mr. Nichols, Mr. Belmont, Mr. Ladd, Mr. Clegg, Mr. Glavin, Mr. Harbo, Mr. Rosen, Mr. Tracy, Mr. Egan, Mr. Gurnea, Mr. Hendon, Mr. Pennington, Mr. Quinn, Mr. Nease, Mr. Gandy

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SUBJECT: [Subject Redacted]

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C2. Canada bluegrass-Rough fescue-Slender wheatgrass

(*Poa compressa*-*Festuca scabrella*-*Agropyron trachycaulum*)

n=13 This community type was described on mesic, lower slope positions with shallow, nutrient poor soils. The presence of blunt sedge, junegrass and plains reedgrass are all indicative of dry, nutrient poor sites. The dominance of Canada bluegrass an introduced, occasional species that is adapted to grow on waste ground also appears to indicate that this community type is typical of nutrient poor soils. This community type appears to have also been moderately grazed. Increased grazing pressure causes rough fescue to decline and allows Canada bluegrass and dandelion to increase.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL
(*Potentilla fruticosa*) 3

FORBS

OLD MAN'S WHISKERS
(*Geum triflorum*) 3
COMMON YARROW
(*Achillea millefolium*) 7
DANDELION
(*Taraxacum officinale*) 9
GRACEFUL CINQUEFOIL
(*Potentilla gracilis*) 3
NORTHERN BEDSTRAW
(*Galium boreale*) 4

GRASSES

ROUGH FESCUE
(*Festuca scabrella*) 7
IDAHO FESCUE
(*Festuca idahoensis*) 9
PARRY OATGRASS
(*Danthonia parryi*) 2
BLUNT SEDGE
(*Carex obtusata*) 6
CANADA BLUEGRASS
(*Poa compressa*) 20

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC-SUBHYGRIC(4.4)

NUTRIENT REGIME (MEAN

SUBMESOTROPHIC TO MESOTROPHIC(3.2)

ELEVATION:

1480(1320-1631) M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE (RANGE):

10(0-30)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 1165(900-1300)

FORB 671(528-858)

SHRUB 15(0-44)

TOTAL 1851(900-3692)

RECOMMENDED STOCKING RATE
0.5 HA/AUM

C3. Kentucky bluegrass-Rough fescue

(*Poa pratensis*-*Festuca scabrella*)

n=59 Long-term heavy grazing pressure leads to decline in rough fescue and an increase in Parry oatgrass and sedge species. Continued grazing pressure reduces the competitive advantage of rough fescue and the other native grass species and allows Kentucky bluegrass to establish on the site. Continued heavy grazing pressure eventually leads to a decline in all native species and the plant community will resemble a Timothy-Kentucky bluegrass/Dandelion type.

The shallow, nutrient poor soils of the Canada bluegrass dominated community type do not appear to favour the growth of Kentucky bluegrass under similar grazing conditions and may explain the lack of Kentucky bluegrass in the Canada bluegrass-Rough fescue-Slender wheatgrass community type..

The forage productivity of this community type (2600 kg/ha) is equivalent to or better than a lightly grazed Rough fescue-Parry oatgrass community (2015 kg/ha). However, rough fescue is a much more desirable forage species because it maintains its nutrient content into the dormant season. In contrast, Kentucky bluegrass loses its palatability, and nutrient content if it is allowed to flower and set seed.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	2
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FORBS

YARROW (<i>Achillea millefolium</i>)	6
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OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	5
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DANDELION (<i>Taraxacum officinale</i>)	5
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GRACEFUL CINQUEFOIL (<i>Potentilla gracilis</i>)	2
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GRASSES

PARRY OATGRASS (<i>Danthonia parryi</i>)	3
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ROUGH FESCUE (<i>Festuca scabrella</i>)	7
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IDAHO FESCUE (<i>Festuca idahoensis</i>)	6
---	---

BLUNT SEDGE (<i>Carex obtusata</i>)	2
--	---

KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	29
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC TO MESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC TO PERMESOTROPHIC

ELEVATION:

1489(1320-1768) M

SOIL DRAINAGE (MEAN):

WELL TO MODERATELY WELL

SLOPE (RANGE):

12(0-55)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 1957(118-5028)

FORB 631(0-1720)

SHRUB 37(0-192)

TOTAL 2572(566-5886)

SUGGESTED STOCKING RATE

0.4 HA/AUM

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C4. Kentucky bluegrass-Timothy/Dandelion

(*Poa pratensis*-*Phleum pratense*/*Taraxacum officinale*)

n=70 This community type appears to once have represented a Rough fescue-Parry oatgrass-Idaho fescue community type on Black Chernozmic soils. Continued heavy grazing at the beginning of the century has shifted the community to one dominated by Kentucky bluegrass, timothy and dandelion.

The climax range condition model suggests that vegetation development will be directional, predictable and revert to the original vegetation when protected from grazing, but once Kentucky bluegrass has established, bluegrass appears to compete with rough fescue for codominance. When protected from grazing these Kentucky bluegrass dominated types move toward a different community type rather than back to the original vegetation. These sites closely follow the "State transition model" proposed by Westoby et al. (1989).

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

BUCKBRUSH
(*Symphoricarpos occidentalis*) 1

FORBS

GRACEFUL CINQUEFOIL
(*Potentilla gracilis*) 4
DANDELION
(*Taraxacum officinale*) 12
COMMON YARROW
(*Achillea millefolium*) 6
MOUSE EARED CHICKWEED
(*Cerastium arvense*) 2
STICKY PURPLE GERANIUM
(*Geranium viscosissimum*) 2

GRASSES

KENTUCKY BLUEGRASS
(*Poa pratensis*) 34
TIMOTHY
(*Phleum pratense*) 25
ROUGH FESCUE
(*Festuca scabrella*) 1
IDAHO FESCUE
(*Festuca idahoensis*) 1
SLENDER WHEATGRASS
(*Agropyron trachycaulum*) 1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

MESIC-SUBMESIC

NUTRIENT REGIME (MEAN):

PERMESOTROPHIC-MESOTROPHIC

ELEVATION:

1495(1350-1682) M

SOIL DRAINAGE (MEAN):

WELL TO MODERATELY WELL

SLOPE(RANGE):

9(0-36)%

ASPECT:

SOUTH TO WESTERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS 2109(244-3120)

FORB 557(26-1186)

SHRUB 69(0-640)

TOTAL 2733(234-3776)

SUGGESTED STOCKING RATE

0.3 HA/AUM

C5. Smooth brome-Kentucky bluegrass

(*Bromus inermis*-*Poa pratensis*)

n=12 These sites probably were once rough fescue dominated. Cultivation and extreme grazing pressure have led to a decline in all native species. If these sites had been left undisturbed they would probably resemble a Rough fescue-Parry oatgrass-Idaho fescue community type.

PLANT COMPOSITION CANOPY COVER(%)

FORBS

CANADA THISTLE (<i>Cirsium arvense</i>)	4
COMMON YARROW (<i>Achillea millefolium</i>)	3
STRAWBERRY (<i>Fragaria virginiana</i>)	3

GRASSES

KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	40
SMOOTH BROME (<i>Bromus inermis</i>)	43
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	1
TIMOTHY (<i>Phleum pratense</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

MESIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC-PERMESOTROPHIC

ELEVATION:

1501(1300-1768) M

SOIL DRAINAGE (MEAN):

WELL

SLOPE (RANGE):

9(0-60)%

ASPECT:

SOUTH TO WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

TOTAL 3000* *ESTIMATE

SUGGESTED STOCKING RATE
0.4 HA/AUM

C6. Sedge/Little clubmoss-Moss phlox

(*Carex obtusata*/*Selaginella densa*-*Phlox hoodii*)

n=5 On dry, gravelly sites within the Parry oatgrass-Rough fescue and Bluebunch wheatgrass dominated community types increased grazing pressure causes Parry oatgrass, rough fescue and bluebunch wheatgrass to decline and allows low growing sedge and forb species to increase to form this community type. Indeed one of the sites (Stoddo) represents the outside transect of a rangeland reference area (Willoughby 1992). The inside transect which has been protected from grazing pressure belongs to the Idaho fescue-Parry oatgrass-Rough fescue community type.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
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FORBS

LITTLE CLUBMOSS (<i>Selaginella densa</i>)	24
SMALL LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	3
NODDING ONION (<i>Allium cernuum</i>)	1
MOSS PHLOX (<i>Phlox hoodii</i>)	13
FRINGED SAGE (<i>Artemisia frigida</i>)	3

GRASSES

BLUNT SEDGE (<i>Carex obtusata</i>)	12
JUNEGRASS (<i>Koeleria macrantha</i>)	7
ROUGH FESCUE (<i>Festuca scabrella</i>)	4
PARRY OATGRASS (<i>Danthonia parryi</i>)	11
NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBXERIC

NUTRIENT REGIME (MEAN):
SUBMESOTROPHIC (4)

ELEVATION:
1424-1787(1631)M

SOIL DRAINAGE (MEAN):
RAPIDLY TO WELL

SLOPE:
12(0-26)%

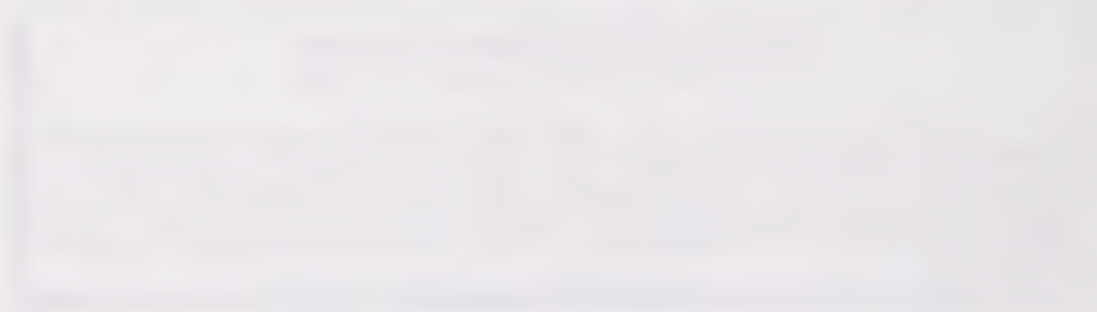
ASPECT:
SOUTHWEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS	460(220)(4)
FORB	355(263)(4)
SHRUB	67(82)(4)
TOTAL	829(367)(4)

SUGGESTED STOCKING RATE
1.1 HA/AUM



[The following text is extremely faint and illegible due to low contrast and blurring. It appears to be a list or table of contents with multiple columns.]

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1. Introduction	1
2. Methodology	5
3. Results	10
4. Discussion	15
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C7. Creeping red fescue/Dandelion-Clover (*Festuca rubra*/*Taraxacum officinale*-*Trifolium repens*)

n=10 This community is an example of a rough fescue grassland which has been modified during reclamation of a natural gas pipeline and power transmission lines. Seed from the reclamation has influenced the plant association such that creeping red fescue and Kentucky bluegrass now dominate the site. Previously tame species like creeping red fescue were used in reclamation with little thought given to compatibility with surrounding native vegetation. It is now recognized that native species that promote the recovery of the original community structure and function should be used in reclamation (Gerling et al. 1996).

PLANT COMPOSITION CANOPY COVER(%)

FORBS

DANDELION (<i>Taraxacum officinale</i>)	4
WHITE DUTCH CLOVER (<i>Trifolium repens</i>)	9
SWEET CLOVER (<i>Melilotus alba</i>)	1
ALFALFA (<i>Medicago sativa</i>)	3
COMMON YARROW (<i>Achillea millefolium</i>)	1
STRAWBERRY (<i>Fragaria virginiana</i>)	3

GRASSES

TIMOTHY (<i>Phleum pratense</i>)	7
CREEPING RED FESCUE (<i>Festuca rubra</i>)	52
BLUNT SEDGE (<i>Carex obtusata</i>)	1
KENTUCKY BLUE GRASS (<i>Poa pratensis</i>)	8

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBMESIC TO SUBHYGRIC
NUTRIENT REGIME (MEAN):
MESOTROPHIC TO PERMESOTROPHIC
ELEVATION:
1503(1380-1615)M
SOIL DRAINAGE (MEAN):
WELL TO MODERATELY WELL
SLOPE (RANGE):
3(0-11)%
ASPECT:
SOUTH

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)
GRASS 1833(1968-2600)
FORB 601(54-1044)
TOTAL 1832(2006-2654)

SUGGESTED STOCKING RATE 0.5 HA/AUM

C8. Northern wheatgrass-Kentucky bluegrass

(*Agropyron dasystachyum*-*Poa pratensis*)

n=1 This community type is found on a dry, moderately to heavily grazed, south-facing slopes with shallow soils above the Oldman river in the Outer Gap range allotment. The moisture regime is not high enough to allow complete invasion of Kentucky bluegrass and dandelion. In the absence of disturbance the community type would probably resemble moister sites within the Bluebunch wheatgrass-Sedge community type.

The Outer Gap allotment is subject to extremely high, dessicating winds. As a result, the climate is very similar to the grasslands described in Rocky Foothills and Rocky Mountain ecodistricts. Indeed many of the species characteristic of the grasslands described in these ecodistricts (junegrass, northern wheatgrass, blunt sedge, small leaved everlasting) are found in this community type.

PLANT COMPOSITION CANOPY COVER(%)

SHRUBS

SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	12
PRAIRIE ROSE (<i>Rosa arkansana</i>)	7

FORBS

DANDELION (<i>Taraxacum officinale</i>)	15
AMERICAN VETCH (<i>Vicia americana</i>)	13
SMALL LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	10
SHOWY LOCOWEED (<i>Oxytropis splendens</i>)	8
LOW GOLDENROD (<i>Solidago missouriensis</i>)	6

GRASSES

NORTHERN WHEATGRASS (<i>Agropyron dasystachyum</i>)	35
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	11
BLUNT SEDGE (<i>Carex obtusata</i>)	10
CANBY BLUEGRASS (<i>Poa canbyi</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

SUBMESIC

NUTRIENT REGIME (MEAN):

SUBMESOTROPHIC

ELEVATION:

1545 M

SOIL DRAINAGE (MEAN):

RAPIDLY TO WELL

SLOPE (RANGE):

15%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)

GRASS	1112
FORB	642
SHRUB	82
TOTAL	1836

SUGGESTED STOCKING RATE

0.5HA/AUM

C9. Rough fescue-Kentucky bluegrass (*Festuca scabrella*-*Poa pratensis*)

n=18 This community type represents grasslands that have been grazed heavily to the point of Kentucky bluegrass invasion and are now recovering, or ungrazed exclosures that have been invaded by Kentucky bluegrass. Long-term heavy grazing pressure leads to a decline in rough fescue and an increase in Parry oatgrass and sedge species. Continued grazing pressure reduces the competitive advantage of rough fescue and the other native grass species and allows Kentucky bluegrass to establish on the site. Protection or a reduction in stocking level at the point where Kentucky bluegrass has become a significant component of the community allows rough fescue to recover, but it seems Kentucky bluegrass also remains as codominant. Willoughby (1996), found that some rangeland reference area sites which were protected from grazing before Kentucky bluegrass became established recovered to Rough fescue-Idaho fescue-Parry oatgrass in 20-30 years. In contrast sites that had significant Kentucky bluegrass invasion recovered to Rough fescue-Kentucky bluegrass dominated sites over the same time period. It appears that both the unidirectional climax range condition model proposed by Dysterhuis (Wroe et al. 1988) and the State and Threshold model proposed by Westoby et al. (1989) apply to the successional sequences of the rough fescue grasslands of southwestern Alberta. This makes it extremely difficult to assess range condition on these sites. That is why the Ecological site and Desired Plant community concepts proposed by the Task Group on Unity in Concepts and Terminology (1995) will likely have to be adopted to determine range condition on these rangelands.

PLANT COMPOSITION CANOPY COVER(%)

FORBS

YARROW (<i>Achillea millefolium</i>)	5
OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	11
DANDELION (<i>Taraxacum officinale</i>)	1

GRASSES

PARRY OATGRASS (<i>Danthonia parryi</i>)	4
ROUGH FESCUE (<i>Festuca scabrella</i>)	23
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	14

SLOPE (RANGE):

7(0-32)%

ASPECT:

SOUTHERLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+-STD. DEV.)(N)

GRASS	1496(1074-2246)
FORB	662(282-1116)
SHRUB	13(0-52)
TOTAL	2172(1722-2614)

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

MESIC TO SUBHYGRIC

NUTRIENT REGIME (MEAN):

MESOTROPHIC TO PERMESOTROPHIC

ELEVATION:

1504(1340-1660) M

SOIL DRAINAGE (MEAN):

WELL TO MODERATELY WELL

SUGGESTED STOCKING RATE
0.4 HA/AUM

C10. Rough fescue-Sedge- Mountain brome
(Festuca scabrella-Carex obtusata-Bromus carinatus)

n=2 This community type represents grasslands that have been grazed moderately. *Bromus carinatus* is an introduced species that is well adapted to moist woods and dry open meadows. The two sites where this community were described were on bottom slope positions.

PLANT COMPOSITION CANOPY COVER(%)

FORBS

YARROW	
<i>(Achillea millefolium)</i>	1
OLD MAN'S WHISKERS	
<i>(Geum triflorum)</i>	3
DANDELION	
<i>(Taraxacum officinale)</i>	1
YELLOW BEARDSTONGUE	
<i>(Penstemon confertus)</i>	5
ALPINE BISTORT	
<i>(Polygonum viviparum)</i>	4
AMERICAN VETCH	
<i>(Vicia americanum)</i>	4

GRASSES

PARRY OATGRASS	
<i>(Danthonia parryi)</i>	1
ROUGH FESCUE	
<i>(Festuca scabrella)</i>	18
MOUNTAIN BROME	
<i>(Bromus carinatus)</i>	23
IDAHO FESCUE	
<i>(Festuca idahoensis)</i>	6

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):

MESIC

NUTRIENT REGIME (MEAN):

PERMESOTROPHIC

ELEVATION:

1540(1494-1585) M

SOIL DRAINAGE (MEAN):

WELL

SLOPE (RANGE):

5(0-15)%

ASPECT:

SOUTHERLY

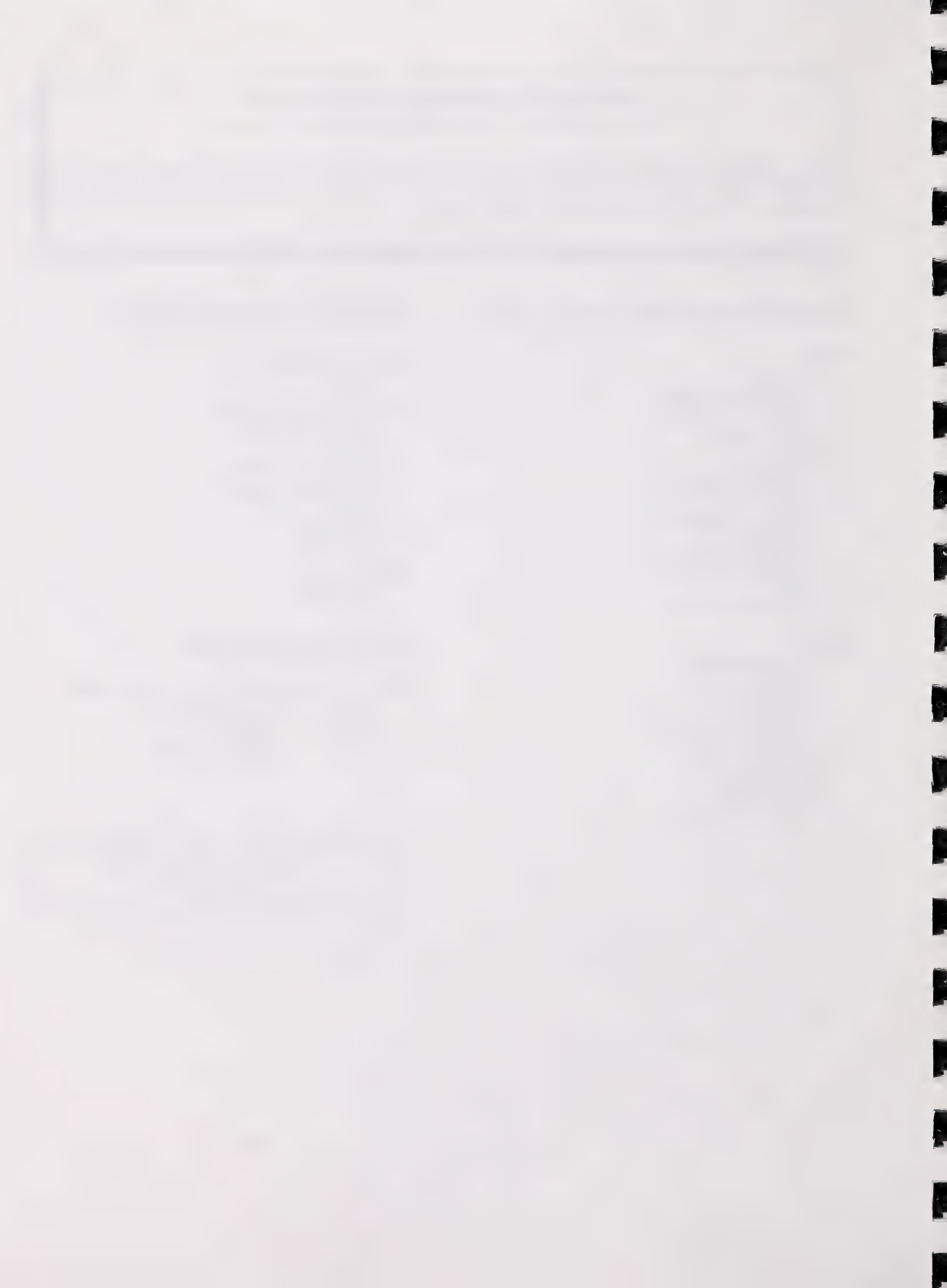
CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+STD. DEV.)(N)

GRASS	2185 (1170-3200)
FORB	136(60-212)
TOTAL	2321(1230-3412)

SUGGESTED STOCKING RATE

0.4 HA/AUM



MONTANE SHRUBLAND ECOLOGY

Shrubland communities in the montane subregion of Alberta occur in valley bottoms, depressional areas, and on moist upland seepage areas. They are highly diverse and dynamic community types that represent transition from wetland to forest or seral stages of development following disturbance. The majority of the shrubland community types were described in the Banff and Jasper Mountain ecodistricts. Only the Willow/Beaked sedge-Marsh reedgrass and Bog birch-Basket willow-Myrtle lv'd willow communities were described in the Blairmore and Morley foothills ecodistricts.

The Green alder-Scouler's willow-Wild red raspberry and Beaked willow/Hairy wild rye community types are found on moist, upland sites. They represent seral stages of development following disturbance. The Green alder-Scouler's willow-Wild red raspberry community type is found on moderate northerly slopes and the Beaked willow/Hairy wild rye community type is found on south-facing slopes with high moisture and nutrient regimes. These upland shrublands provide excellent forage for wildlife in the early stages of development.

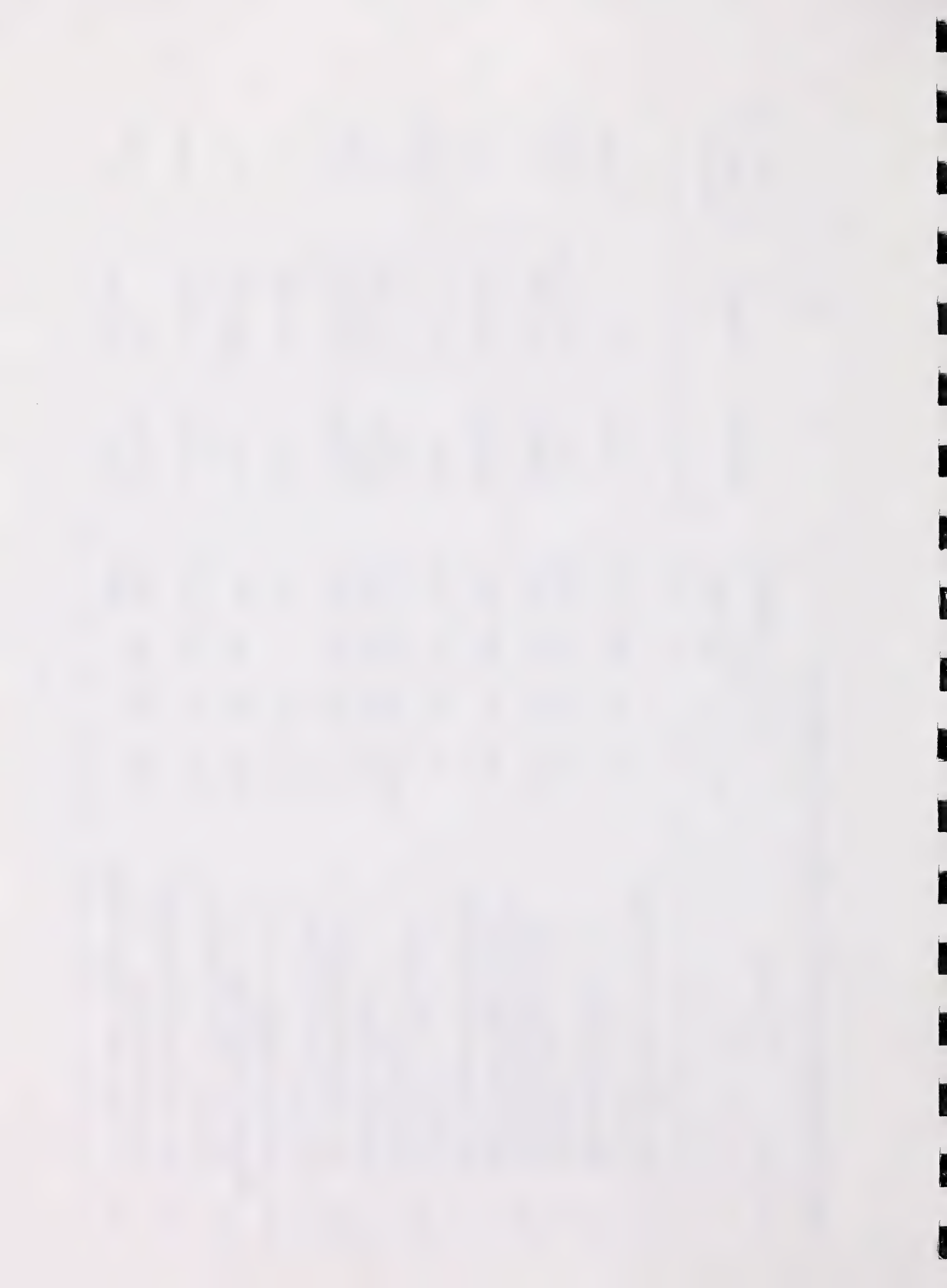
Lowland shrublands are found in low, marshy or bog sites and are often considered the edaphic climax communities on these sites since the wet cool soil conditions often prevent succession to forest. However, where organic matter begins to accumulate and the site becomes drier, succession to either black spruce or white spruce will occur. The extent of the shrub cover is highly dependent on the water level. Colonization by willow and other shrubs such as dwarf and bog birch begins on the drier edges of sedge meadows and streams. This colonization expands if the water level decreases, but declines under prolonged exposure to flooded conditions. The understory species most often associated with these shrublands include wire rush, beaked sedge, water sedge, other wetland sedges, and horsetail on the wettest sites. Bluejoint, slender wheatgrass, shrubby cinquefoil, and upland sedges are found on the more mesic, better drained sites. Where water sedge and/or golden moss are dominant in the understory (White spruce-Willow/Water sedge/Golden moss community type), this indicates a calcium-rich environment, often with stagnant water (Beckingham, 1994; MacKinnon et. al., 1992). A dominance of beaked sedge in the understory (Willow/Beaked sedge-Bluejoint and Bog birch-Basket willow-Myrtle-leaved willow community types), indicates nitrogen-rich conditions with flowing water (Beckingham, 1994). Bluejoint is a common understory species on the better-drained sites in these community types. It appears that tufted hair grass will replace bluejoint on similar sites as elevation increases (Sundquist et. al., 1997).

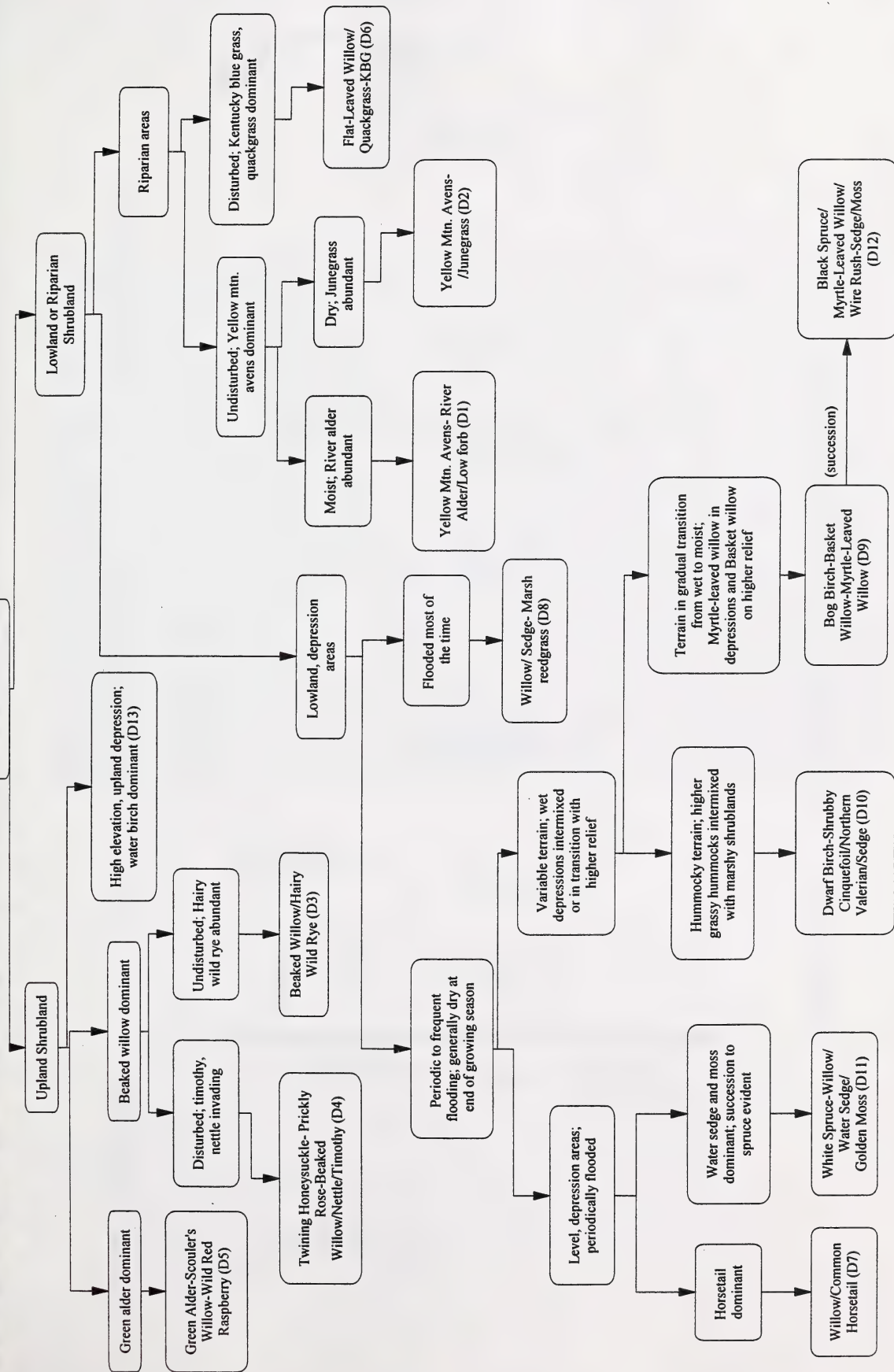
The shrublands found adjacent to riparian areas occur on well-drained, coarse-textured soils. Flat-leaved willow and river alder are almost strictly riparian species. Flat-leaved willow is found only on streamside silt and gravel bars or on low streambanks where the water table is shallow but the substrate drains well (Jaques and Corbin, 1981). River alder indicates a seepage area when found on a slope as in the Yellow mountain avens-River alder/Low forb community type. Elsewhere, it grows best on poorly-drained, lower slope positions. Yellow mountain avens is a common pioneer species on gravelly river bars and rocky slopes and grows especially well on calcium-rich soils (MacKinnon et. al., 1992). Silverberry is also common in these riparian areas. It prefers well-drained, coarse-textured soils such as in the Yellow mountain avens-Silverberry/Junegrass community type. The riparian shrublands described here will eventually succeed to white spruce in the absence of disturbance.



Table 3. Shrubland community types of the Montane subregion.

Community	Community type	Productivity (kg/ha) (*estimated)			Moisture	Drainage	Carrying Capacity (ha/AUM)
		Grass	Forb	Shrub Total			
D1.	Yellow mountain avens-River alder/ Low forb	0*	10*	200* 210*	Submesic	Well	non-use
D2.	Yellow mountain avens/ June grass	200*	10*	50* 260*	Xeric	Very Rapidly	non-use
D3.	Beaked willow/Hairy wild rye	1000*	200*	200* 1400*	Subhygric	Mod. Well	1.3
D4.	Twining honeysuckle-Prickly rose- Beaked willow/Nettle/Timothy	750*	250*	500* 1500*	Subhygric	Imperfectly	1.2
D5.	Green alder-Scouler's willow-Wild red raspberry	0*	10*	150* 160*	Mesic	Well	non-use
D6.	Flat-leaved willow/Quackgrass- Kentucky bluegrass	2000*	200*	300* 2500*	Subhygric	Mod. Well	0.7
D7.	Willow/Field horsetail	0*	300*	200* 500*	Hygric	Imperfectly	non-use
D8.	Willow/Sedge-Marsh reedgrass	872	224	446 1541	Subhydric	Very Poorly	non-use
D9.	Bog birch-Basket willow-Myrtle- leaved willow	1270	372	0 1642	Hygric	Mod. Well	1.1
D10.	Dwarf birch-Shrubby cinquefoil/ Northern valerian/Sedge	1500*	200*	300* 2000*	Hygric	Imperfectly	0.9
D11.	White spruce-Willow/Water sedge/ Golden moss	750*	100*	400* 1250*	Subhydric	Very Poorly	non-use
D12.	Black spruce/Myrtle-leaved willow/ Wire rush-Sedge/Moss	350*	50*	500* 900*	Subhydric	Poorly	non-use
D13.	Water birch-Smooth willow/Pinegrass			1800*	Hygric	Imperfectly	1.2





UPLAND SHRUBLANDS

LOWLAND, DEPRESSION AREAS

RIPARIAN AREAS

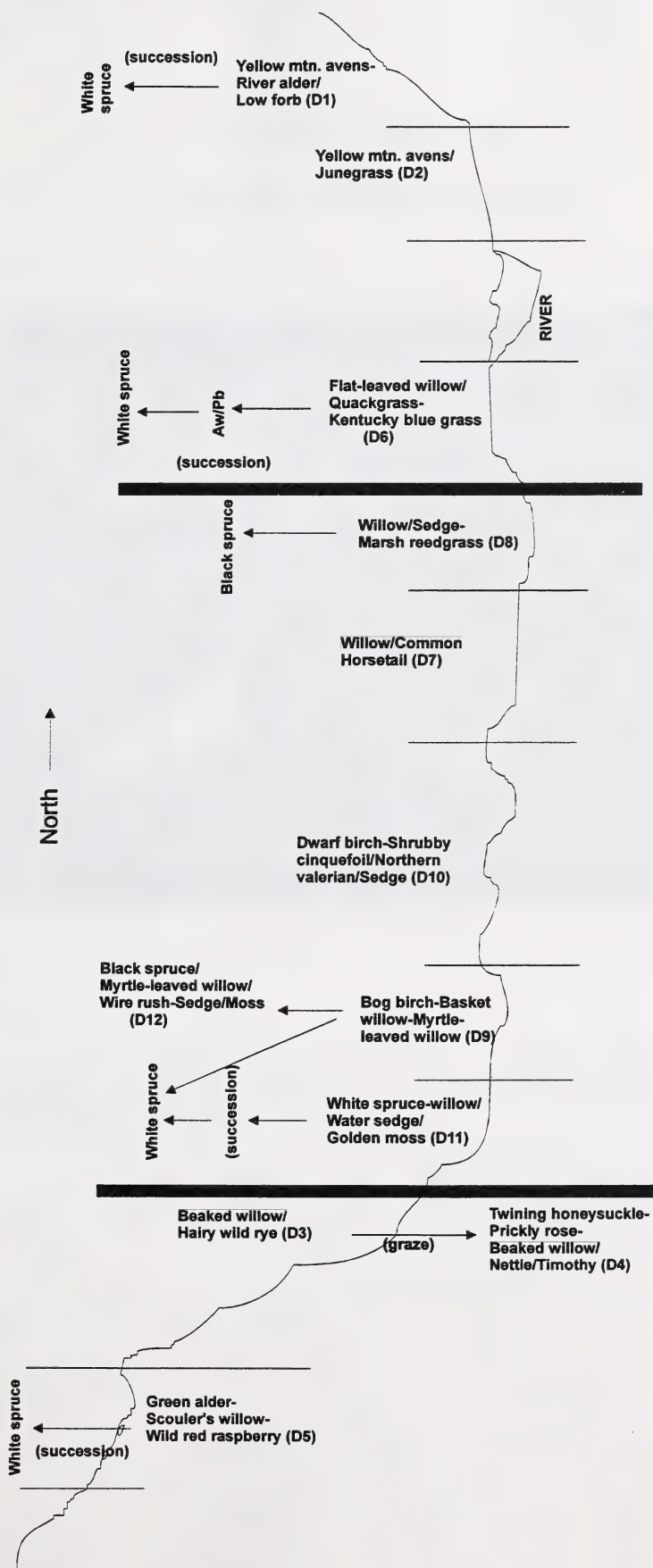


FIGURE 3: Landscape profile of montane shrubland community types

MONTANE SUBREGION
SHRUBLAND COMMUNITY TYPES



Photo 7: This photo represents a Basket willow-Bog birch/Sedge community type. These shrublands are found in valley depressions and are wet for much of the year. They provide excellent browse for wildlife.

D1. Yellow Mountain Avens-River Alder/ Low Forb
(Dryas drummondii-Alnus tenuifolia/Low forb)

n=1 This community type is found on an open, south-facing slope which supports a few scattered balsam poplar trees. The abundance of river alder and presence of balsam poplar indicates that this is a moist, nutrient-rich seep. In contrast yellow mountain avens grows favorably on open, well-drained sites and is typical of dry, gravelly river flats throughout Alberta. Willoughby and Smith (1997) described a Balsam poplar-White spruce/Willow/Yellow mtn. avens community type that is similar, but successional more mature in the Upper Foothills subregion. In the absence of disturbance, river alder and balsam poplar will increase causing mountain avens to decrease as the site becomes shaded. Eventually this site will succeed to white spruce forest. This community type would be found upslope from the Yellow mtn. avens-Silverberry/Junegrass community type (D2) which is found on the level river flats.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR
(Populus balsamifera) 5

SHRUBS

WHITE SPRUCE SEEDLINGS
(Picea glauca) 3
 LODGEPOLE PINE SEEDLINGS
(Pinus contorta) 1
 RIVER ALDER
(Alnus tenuifolia) 10

DWARF SHRUBS

YELLOW MTN. AVENS
(Dryas drummondii) 25

FORBS

COMMON YARROW
(Achillea millefolium) 1
 LINDLEY'S ASTER
(Aster ciliolatus) 1
 DANDELION
(Taraxacum officinale) 1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC (4)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3)

ELEVATION: 1210 M

ASPECT: SOUTHWEST

SLOPE: 10%

SOIL DRAINAGE (MEAN): WELL (3)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
 (ESTIMATED):

GRASS	0
FORBS	10
SHRUBS	200
TOTAL	210

STOCKING RATE
 8.7 HA/AUM OR 21.4 AC/AUM
 RECOMMENDED STOCKING RATE
 NON-USE

D2: Yellow Mountain Avens/Junegrass
(Dryas drummondii/Koeleria macrantha)

n=2 This community type is typical of dry, gravelly river flats with nutrient poor soils. Mountain avens, silverberry, bearberry, juniper and junegrass are all characteristic of dry, rapidly-drained soils. Willoughby and Smith (1997) also describe a similar community type on dry, gravelly, well-drained river flats in the Upper Foothills Subregion. The poor soil conditions limits the forage productivity and amount of regrowth after grazing. This community type should be rated as secondary or non-use range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

WHITE SPRUCE <i>(Picea glauca)</i>	1
TREMBLING ASPEN <i>(Populus tremuloides)</i>	1

SHRUBS

SILVERBERRY <i>(Elaeagnus commutata)</i>	5
CREeping JUNIPER <i>(Juniperus horizontalis)</i>	1
SHRUBBY CINQUEFOIL <i>(Potentilla fruticosa)</i>	2

DWARF SHRUBS

YELLOW MTN. AVENS <i>(Dryas drummondii)</i>	35
COMMON BEARBERRY <i>(Arctostaphylos uva-ursi)</i>	2

FORBS

COMMON YARROW <i>(Achillea millefolium)</i>	4
REFLEXED LOCO-WEED <i>(Oxytropis deflexa)</i>	3
CUT-LEAVED ANEMONE <i>(Anemone multifida)</i>	1

GRASSES

JUNEGRASS <i>(Koeleria macrantha)</i>	21
AWNLESS BROME <i>(Bromus inermis)</i>	4
MARSH REED GRASS <i>(Calamagrostis canadensis)</i>	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC-SUBXERIC (2)

NUTRIENT REGIME (MEAN): SUBMESOTROPHIC (2)

ELEVATION: 1529(1210-1848) M

ASPECT: EAST

SLOPE: 1%

SOIL DRAINAGE (MEAN): VERY RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED)

GRASS	200
FORBS	10
SHRUBS	50
TOTAL	260

STOCKING RATE
 3.5 HA/AUM OR 8.6 AC/AUM
 RECOMMENDED STOCKING RATE
 NON-USE

D3: Beaked Willow/Hairy Wild Rye
(*Salix bebbiana*/*Elymus innovatus*)

n=2 This community type represents a drier upland willow type which can be found on north-facing slopes, ravines and seepage areas. The moisture and nutrient regimes favor an abundance of willow and the presence of a few scattered spruce trees. Beaked willow is highly palatable to wild ungulates, therefore, this community should be considered important wildlife habitat. In the absence of disturbance, this community type will likely succeed to the climax white spruce forest.

PLANT COMPOSITION CANOPY COVER (%)

TREES

WHITE SPRUCE
(*Picea glauca*) 5

SHRUBS

BEAKED WILLOW
(*Salix bebbiana*) 20
CANADA BUFFALOBERRY
(*Shepherdia canadensis*) 8
WHITE SPRUCE SEEDLINGS
(*Picea glauca*) 6
WILLOW
(*Salix spp.*) 4

FORBS

WILD STRAWBERRY
(*Fragaria virginiana*) 6
COMMON YARROW
(*Achillea millefolium*) 3
LINDLEY'S ASTER
(*Aster ciliolatus*) 3
NORTHERN BEDSTRAW
(*Galium boreale*) 3
ALPINE HEDYSARUM
(*Hedysarum alpinum*) 3

GRASSES

HAIRY WILD RYE
(*Elymus innovatus*) 38
WIRE RUSH
(*Juncus balticus*) 3
BLUEGRASS
(*Poa spp.*) 3
TIMOTHY
(*Phleum pratense*) 2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC (5.5)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 1000 - 1060 M (1030 M)

ASPECT: VARIABLE

SLOPE: 0-5%

SOIL DRAINAGE: MODERATELY WELL (4)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	1000
FORBS	200
SHRUBS	200
TOTAL	1400

RECOMMENDED STOCKING RATE
1.3 HA/AUM OR 3.2 AC/AUM

D4: Twining Honeysuckle-Prickly Rose-Beaked Willow/Nettle/Timothy
(Lonicera dioica-Rosa acicularis-Salix bebbiana/Urtica spp./Phleum pratense)

n=1 This community type is very similar to the Beaked willow/Hairy wild rye community type (D3), however, this community type has been altered by grazing. The dominant shrub species in this type are very similar to the understory of an aspen forest which would indicate that this community type is likely adjacent to an aspen forest. The area occupied within this community type is likely more open than the adjacent aspen forest which explains the heavy use by livestock. The grazing pressure has promoted the establishment of timothy as well as weeds such as nettle. Like the Beaked willow/Hairy wild rye community type, this type will likely succeed to white spruce in the absence of disturbance.

PLANT COMPOSITION CANOPY COVER (%)

TREES

WHITE SPRUCE
(Picea glauca) 1

SHRUBS

TWINING HONEYSUCKLE
(Lonicera dioica) 25
 PRICKLY ROSE
(Rosa acicularis) 15
 BEAKED WILLOW
(Salix bebbiana) 14
 WILD RED RASPBERRY
(Rubus idaeus) 10
 RED-OSIER DOGWOOD
(Cornus stolonifera) 2

FORBS

NETTLE
(Urtica spp.) 25
 WILD VETCH
(Vicia americana) 6
 MICHAUX'S SAGE
(Artemisia michauxiana) 3
 COMMON YARROW
(Achillea millefolium) 2

GRASSES

TIMOTHY
(Phleum pratense) 25
 MARSH REEDGRASS
(Calamagrostis canadensis) 1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC (6)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 910 M

SOIL DRAINAGE: IMPERFECTLY (5)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
 (ESTIMATED):

GRASS	750
FORBS	250
SHRUB	500
TOTAL	1500

RECOMMENDED STOCKING RATE
 1.2 HA/AUM OR 3.0 AC/AUM

D5: Green Alder-Scouler's Willow-Wild Red Raspberry
(*Alnus crispa*-*Salix scouleriana*-*Rubus idaeus*)

n=2 This community type is generally found on mesic to hygric lower subalpine sites on moderate northerly slopes. Soils are moderately well to well-drained on morainal landforms with the community occurring in seepage areas (Corns and Achuff, 1982). This type is similar to Jaques and Corbin's (1981) Scouler's willow-Beaked willow type. It is also comparable to the Willow-Alder-Low bush cranberry/Shield fern type described by Sundquist et al. (1997) in the Lower Foothills subregion on similar site types. *Salix scouleriana* dominates the overstory and alder makes up a major portion of the understory cover. Dominance of alder may indicate a recent fire or other disturbance in the understory since alder regenerates faster than *Salix scouleriana*. White spruce, aspen, balsam poplar and lodgepole pine can often be found to regenerate in this community type, therefore this community type will likely succeed to white spruce (Corns and Achuff, 1982).

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

GREEN ALDER (<i>Alnus crispa</i>)	43
SCOULER'S WILLOW (<i>Salix scouleriana</i>)	35
WILD RED RASPBERRY (<i>Rubus idaeus</i>)	21
PRICKLY ROSE (<i>Rosa acicularis</i>)	8

FORBS

VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	10
WESTERN CANADA VIOLET (<i>Viola canadensis</i>)	8
RED AND WHITE BANEERRY (<i>Actaea rubra</i>)	5
BUNCHBERRY (<i>Cornus canadensis</i>)	3

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	3
MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO SUBHYGRIC
(5.5)

NUTRIENT REGIME (MEAN): MESOTROPHIC TO
PERMESOTROPHIC (3.5)

ELEVATION: 1270-1580 M (1425 M)

ASPECT: NORTHERLY

SLOPE: 12-75%

SOIL DRAINAGE: WELL (3)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	0
FORBS	10
SHRUBS	150
TOTAL	160

STOCKING RATE
11.4 HA/AUM OR 28.1 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

D6: Flat-Leaved Willow/Quackgrass-Kentucky Bluegrass
(*Salix planifolia*/Agropyron repens-Poa spp.)

n=2 This community type represents a disturbed willow shrubland. *Salix planifolia* prefers areas where the water table is shallow, but the substrate drains well, therefore this community type is likely found adjacent to riparian areas on course-textured soils. Heavy grazing of this type has affected the understory vegetation allowing an increase in quackgrass and Kentucky bluegrass on the drier portions of this community type. The proximity to water and shallow water table would explain the heavy use by livestock as well as the high production. Care must be taken to ensure that the riparian habitat is not over-used by livestock.

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

FLAT-LEAVED WILLOW (<i>Salix planifolia</i>)	41
DWARF BIRCH (<i>Betula pumila</i>)	1

FORBS

MARSH VIOLET (<i>Viola palustris</i>)	3
RUSH ASTER (<i>Aster borealis</i>)	2

GRASSES

QUACKGRASS (<i>Agropyron repens</i>)	18
KENTUCKY BLUE GRASS (<i>Poa pratensis</i>)	18
BLUE GRASS (<i>Poa spp.</i>)	9
GREEN SEDGE (<i>Carex viridula</i>)	4
ALPINE RUSH (<i>Juncus alpinus</i>)	4
BEAKED SEDGE (<i>Carex rostrata</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO HYGRIC (6)

NUTRIENT REGIME (MEAN): MESOTROPHIC TO
PERMESOTROPHIC (3.5)

ELEVATION: 990-1160 M (1075 M)

SOIL DRAINAGE: WELL TO POORLY (4.5)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	2000
FORBS	200
SHRUB	300
TOTAL	2500

RECOMMENDED STOCKING RATE
0.7 HA/AUM OR 1.8 AC/AUM

D7: Willow/Field horsetail
(*Salix spp./Equisetum arvense*)

n=1 This is a highly unusual community type for the montane. It will likely only be found at the lower elevational limits of the montane subregion. Corns and Achuff (1982) describe this community type on hygric, level to gently sloping fluvial landforms of various aspects. The soils are imperfectly to poorly drained and are subject to periodic flooding and sediment deposition. Tree cover is absent and willow cover is high. Field horsetail is the dominant herb. Other species may also be found, such as dwarf shrubs and sedges, however, these are minor components.

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

WILLOW (<i>Salix spp.</i>)	40
RED-OSIER DOGWOOD (<i>Cornus stolonifera</i>)	1
PRICKLY ROSE (<i>Rosa acicularis</i>)	1

FORBS

FIELD HORSETAIL (<i>Equisetum arvense</i>)	40
SWEET-SCENTED BEDSTRAW (<i>Galium triflorum</i>)	1
TALL LUNGWORT (<i>Mertensia paniculata</i>)	1
COMMON DANDELION (<i>Taraxacum officinale</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): HYGRIC (7)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 980 M

SOIL DRAINAGE: IMPERFECTLY (5)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	0
FORBS	300
SHRUB	200
TOTAL	500

STOCKING RATE
3.6 HA/AUM OR 9.0 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

D8: Willow/Sedge-Marsh reedgrass
(*Salix spp./Carex rostrata-Calamagrostis canadensis*)

n=7 This community type is similar to the Willow-Bog birch/Sedge community type of Sundquist et al (1997). It represents a typical willow/sedge community type found on wet, poorly drained soils. There are numerous different species of willow as a result of the open canopy and the wet moisture regime. A high cover of beaked sedge indicates a nitrogen-rich environment where the water is moving. Tufted hair grass (*Deschampsia cespitosa*) will replace marsh reedgrass in this community type at higher elevations (Sundquist et al, 1997). This would be considered an edaphic climax community since the area is frequently flooded which prevents establishment of trees although it may be found in association with black spruce and black spruce-larch community types. This community type would be considered non-use for livestock due to the poor access caused by the wet substrate.

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

WILLOW (<i>Salix spp.</i>)	21
BOG BIRCH (<i>Betula glandulosa</i>)	14
SHRUBBY WILLOW (<i>Salix arbusculoides</i>)	3
AUTUMN WILLOW (<i>Salix serissima</i>)	1

FORBS

ARROW-LEAVED COLTSFOOT (<i>Petasites saggitatus</i>)	1
LARGE-LEAVED AVENS (<i>Geum macrophyllum</i>)	1
LINDLEYS ASTER (<i>Aster ciliolatus</i>)	5
STRAWBERRY (<i>Fragaria virginiana</i>)	3

GRASSES

SEDGE (<i>Carex rostrata, C. aquatilis</i>)	31
MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	1
WIRE RUSH (<i>Juncus balticus</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): HYDRIC-HYGRIC (8)

NUTRIENT REGIME (MEAN): MESOTROPHIC-
PERMESOTROPHIC (4)

ELEVATION: 1470(1322-1524) M

SOIL DRAINAGE: IMPERFECTLY- VERY POORLY (7)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	872(422-1800)
FORBS	224(24-700)
SHRUB	446(294-710)
TOTAL	1541(740-3000)

STOCKING RATE
0.6 HA/AUM OR 1.5 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

D9: Bog Birch-Basket Willow-Myrtle-Leaved Willow
(*Betula glandulosa*-*Salix petiolaris*-*Salix myrtillifolia*)

n=5 This community type represents an ecotone from subhydric to mesic. *Salix myrtillifolia* represents the wetter, cooler end of the ecotone where the soils are poorly drained, and *Salix petiolaris* represents the slightly drier portion of the ecotone where the soils are well to moderately-well drained. None of the dominant shrubs in this community type are palatable to wild ungulates, however the understory shrubs and forbs could provide a substantial amount of forage depending on the moisture regime and the extent of shrub cover. In the more open grassy areas associated with *Salix petiolaris*, *Deschampsia cespitosa* (tufted hair grass) can be found along with *Calamagrostis canadensis* (marsh reedgrass) and upland sedges. In the *Salix myrtillifolia* association, wetland sedges dominate. These areas would most likely be considered non-use due to the wet substrate. This community type (specifically the *Salix myrtillifolia* association) will most likely succeed to the Black spruce/Myrtle-leaved willow/Wire rush-Sedge/Moss community type (D12).

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

BOG BIRCH (<i>Betula glandulosa</i>)	11
BASKET WILLOW (<i>Salix petiolaris</i>)	26
MYRTLE-LEAVED WILLOW (<i>Salix myrtillifolia</i>)	9
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	2
HOARY WILLOW (<i>Salix candida</i>)	5
SMOOTH WILLOW (<i>Salix glauca</i>)	4

FORBS

VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	3
FIREWEED (<i>Epilobium angustifolium</i>)	2
PURPLE AVENS (<i>Geum rivale</i>)	2
SMOOTH ASTER (<i>Aster laevis</i>)	3

GRASSES

WIRE RUSH (<i>Juncus balticus</i>)	5
BEAKED SEDGE (<i>Carex rostrata</i>)	5
GRACEFUL SEDGE (<i>Carex praegracilis</i>)	3
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	2

MELIC GRASS (<i>Melica smithii</i>)	2
CREeping RED FESCUE (<i>Festuca rubra</i>)	1
MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	1
TUFTED HAIR GRASS (<i>Deschampsia cespitosa</i>)	T

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO SUBHYDRIC (6.5)
NUTRIENT REGIME (MEAN): MESOTROPHIC TO PERMESOTROPHIC (3.5)
ELEVATION: 1440 M
SLOPE: 0-6%
ASPECT: NORTHERLY
SOIL DRAINAGE: WELL TO POORLY (4.5)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA (+/- STD. DEV)
GRASS 1270
FORBS 372
SHRUB 0
TOTAL 1642 (681)

RECOMMENDED STOCKING RATE
1.1 HA/AUM OR 2.7 AC/AUM

D10: Dwarf Birch-Shrubby Cinquefoil/Northern Valerian/Sedge
(Betula pumila-Potentilla fruticosa/Valeriana dioica/Carex spp.)

n=2 This community type occurs on hummocky terrain. On wet, marshy sites, *Betula pumila*, *Salix glauca*, *Salix maccalliana* and *Carex aquatilis* are found. On the drier, subhygric hummocks, grassy open areas are dominated by *Potentilla fruticosa*, *Deschampsia cespitosa*, and *Elymus innovatus*. The drier hummocks would be the only areas useful for domestic livestock, but may be difficult to access if the low areas are flooded. Therefore, this community type should be considered secondary range for domestic livestock.

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

DWARF BIRCH <i>(Betula pumila)</i>	23
SHRUBBY CINQUEFOIL <i>(Potentilla fruticosa)</i>	18
SMOOTH WILLOW <i>(Salix glauca)</i>	13
VELVET-FRUITED WILLOW <i>(Salix maccalliana)</i>	15

FORBS

BEARBERRY <i>(Arctostaphylos uva-ursi)</i>	3
NORTHERN VALERIAN <i>(Valeriana dioica)</i>	5
SHOWY EVERLASTING <i>(Antennaria pulcherrima)</i>	1
FIREWEED <i>(Epilobium angustifolium)</i>	1
NORTHERN BEDSTRAW <i>(Galium boreale)</i>	1
ELEPHANT'S HEAD <i>(Pedicularis groenlandica)</i>	3

GRASSES

HAIRY WILD RYE <i>(Elymus innovatus)</i>	2
SEDGE <i>(Carex spp.)</i>	20
TUFTED HAIR GRASS <i>(Deschampsia cespitosa)</i>	13
RUSH-LIKE SEDGE <i>(Carex scirpoidea)</i>	8
WATER SEDGE <i>(Carex aquatilis)</i>	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC TO
SUBHYDRIC (7)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 1390-1440 M (1415 M)

SOIL DRAINAGE: IMPERFECTLY TO POORLY (5.5)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	1500
FORBS	200
SHRUB	300
TOTAL	2000

RECOMMENDED STOCKING RATE
0.9 HA/AUM OR 2.2 AC/AUM

D11: White Spruce-Willow/Water Sedge/Golden Moss
(*Picea glauca*-*Salix spp./Carex aquatilis/Tomenthypnum nitens*)

n=2 This community type represents a wet willow shrubland succeeding to white spruce. The high water sedge and golden moss cover indicates a calcium-rich environment (Beckingham, 1994; MacKinnon et al., 1992). As organic matter accumulates and the site becomes drier, willow and spruce will increase in cover. This community would be considered non-use for domestic livestock, however, *Salix arbusculoides* and *Salix bebbiana* are very palatable to wild ungulates, therefore, this type would be considered important wildlife habitat.

PLANT COMPOSITION CANOPY COVER (%)

SHRUBS

WHITE SPRUCE SEEDLINGS (<i>Picea glauca</i>)	6
SHRUBBY WILLOW (<i>Salix arbusculoides</i>)	18
DWARF BIRCH (<i>Betula pumila</i>)	4
BEAKED WILLOW (<i>Salix bebbiana</i>)	4
COMMON LABRADOR TEA (<i>Ledum groenlandicum</i>)	2
LODGEPOLE PINE SEEDLINGS (<i>Pinus contorta</i>)	1

FORBS

RUSH ASTER (<i>Aster borealis</i>)	1
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	1
SWAMP HORSETAIL (<i>Equisetum fluviatile</i>)	10
DEWBERRY (<i>Rubus pubescens</i>)	1

GRASSES

WATER SEDGE (<i>Carex aquatilis</i>)	29
BEAKED SEDGE (<i>Carex rostrata</i>)	3
MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	1

MOSSES

GOLDEN MOSS (<i>Tomenthypnum nitens</i>)	42
RUSTY PEAT MOSS (<i>Sphagnum fuscum</i>)	8

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYDRIC (8)

NUTRIENT REGIME (MEAN): EUTROPHIC (5)

ELEVATION: 1240 M

ASPECT: VARIABLE

SLOPE: 0-2 %

SOIL DRAINAGE: VERY POORLY (7)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

GRASS	750
FORBS	100
SHRUB	400
TOTAL	1250

STOCKING RATE
1.5 HA/AUM OR 3.6 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

D12: Black Spruce/Myrtle-Leaved Willow/Wire Rush-Sedge/Moss
(Picea mariana/Salix myrtillifolia/Juncus balticus-Carex spp./ Moss spp.)

n=3 This community type represents a wet willow shrubland succeeding to black spruce. It is most similar to the Bog birch-Basket willow-Myrtle-leaved willow community type (D9), however this one is successional more advanced. *Salix myrtillifolia* is characteristic of mossy bogs, muskegs and moist conifer forests (Jaques and Corbin, 1981). This would be considered non-use for domestic livestock and wildlife because *Salix myrtillifolia* is generally unpalatable.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BLACK SPRUCE
(Picea mariana) 7

SHRUBS

BLACK SPRUCE SEEDLINGS
(Picea mariana) 16
 LABRADOR TEA
(Ledum groenlandicum) 3
 MYRTLE-LEAVED WILLOW
(Salix myrtillifolia) 25
 SHRUBBY CINQUEFOIL
(Potentilla fruticosa) 4
 DWARF BIRCH
(Betula pumila) 3
 PRICKLY ROSE
(Rose acicularis) 2

FORBS

DWARF SCOURING RUSH
(Equisetum scirpoides) 2
 NORTHERN BED STRAW
(Galium boreale) 1

GRASSES

WIRE RUSH
(Juncus balticus) 14
 SHEATHED SEDGE
(Carex vaginata) 15
 HAIR-LIKE SEDGE
(Carex capillaris) 2
 NEBRASKA SEDGE
(Carex nebraskensis) 5

MOSSES

GOLDEN MOSS

(Tomenthypnum nitens) 10
 TUFTED MOSS
(Aulacomnium palustre) 4
 BROWN MOSS
(Drepanocladus revolvens) 7

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC TO
 SUBHYDRIC (6.5)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 1290-1300 M (1295 M)

SOIL DRAINAGE: POORLY (6)

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
 (ESTIMATED):

GRASS	350
FORBS	50
SHRUB	500
TOTAL	900

STOCKING RATE 2.0 HA/AUM OR 5.0 AC/AUM RECOMMENDED STOCKING RATE NON-USE

D13: Water birch-Smooth willow/Pinegrass
(Betula occidentalis-Salix glauca/Calamagrostis rubescens)

n=1 This community was described on a hilltop depression which supports a high moisture and nutrient regime. The depression also provides protection from the prevailing winds. Therefore, shrubs are abundant, however, due to wet conditions at the bottom of the depression, trees will likely only develop on the drier edges. The surrounding wind-exposed areas support grassland vegetation, therefore, this community type would provide good shelter for livestock later in the fall when the site had dried.

PLANT COMPOSITION CANOPY COVER (%)

TREES

SUBALPINE FIR <i>(Picea glauca)</i>	1
--	---

SHRUBS

BRACTED HONEYSUCKLE <i>(Lonicera involucrata)</i>	6
WATER BIRCH <i>(Betula occidentalis)</i>	21
SMOOTH WILLOW <i>(Salix glauca)</i>	21
SNOWBERRY <i>(Symphoricarpos occidentalis)</i>	15

FORBS

SHOWY ASTER <i>(Aster conspicuus.)</i>	10
STRAWBERRY <i>(Fragaria virginiana)</i>	8
WINTERGREEN <i>(Pyrola asarifolia)</i>	7
SMOOTH ASTER <i>(Aster laevis)</i>	7

GRASSES

PINEGRASS <i>(Calamagrostis rubescens)</i>	15
PRAIRIE SEDGE <i>(Carex prairea)</i>	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC (6)

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (4)

ELEVATION: 1600 M

SOIL DRAINAGE: POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
(ESTIMATED):

TOTAL 1500

RECOMMENDED STOCKING RATE 1.2 HA/AUM OR 3.0 AC/AUM

MONTANE FOREST ECOLOGY

The Montane subregion is distinguished from other subregions by having two distinct ecological sequences: Douglas-fir (Fd) and limber pine (Pf) in one sequence, and lodgepole pine (Pl) in another (Figure 4). Douglas-fir is the climax species on steep, south-facing, shallow rocky soils, and very coarse-textured outwash in valley bottoms (Strong 1992). Limber pine occupies exposed rocky outcrops where the environmental conditions are extreme. These sites are very xeric with shallow, poorly developed soils. Kuchar (1973) noted that the limber pine in Alberta is found at the northern limit of its range since it is found well below timberline. It is normally associated with high elevations or timberline south of Alberta where it takes on a krummholz form (dwarfed, contorted form, maintained by strong winds).

Closed-canopied lodgepole pine stands represent the primary reference vegetation for the montane subregion, since they often occur on mesic sites (Strong 1992). In contrast, closed-canopied aspen (Aw) stands tend to occur on sites that are warmer and drier than the reference sites (Strong 1992). Douglas-fir and white spruce (Sw) represent the potential climatic climax species for both lodgepole pine and aspen stands (Strong 1992; La Roi and Hnatiuk 1980). Balsam poplar (Pb), however, occupies the moistest sites and will succeed to white spruce since the high moisture content is not conducive to Douglas-fir succession.

Common understory species include thimbleberry, creeping mahonia, Canada buffaloberry, bearberry, snowberry and white meadowsweet. These species tend to define the ecosites and ecosite phases as described by Archibald et al. (1996). Thimbleberry and creeping mahonia are more common in the Castle area of the province. Moving north of Blairmore in the Montane thimbleberry is often replaced by cow parsnip and creeping mahonia by white meadowsweet on similar ecosites.

Many of the forested communities at lower elevations (1400-1500 m) in the Castle area were dominated by subalpine species (subalpine fir (Fa), Engelmann spruce (Se)), whereas the Montane grasslands in this area were described up to elevations of 2000 m. This resulted in a broad range of characteristic species on modal sites. Archibald et al. (1996) felt there had to be further refinement of the Subalpine subregion into upper and lower latitudinal subdivisions. Clearly, this would help to refine the classification of community types in the Castle area.

One hundred and fifty-three forested sites have been classified into 22 coniferous, 12 mixedwood, and 15 deciduous community types. The common species, canopy cover, community characteristics and productivity are outlined.

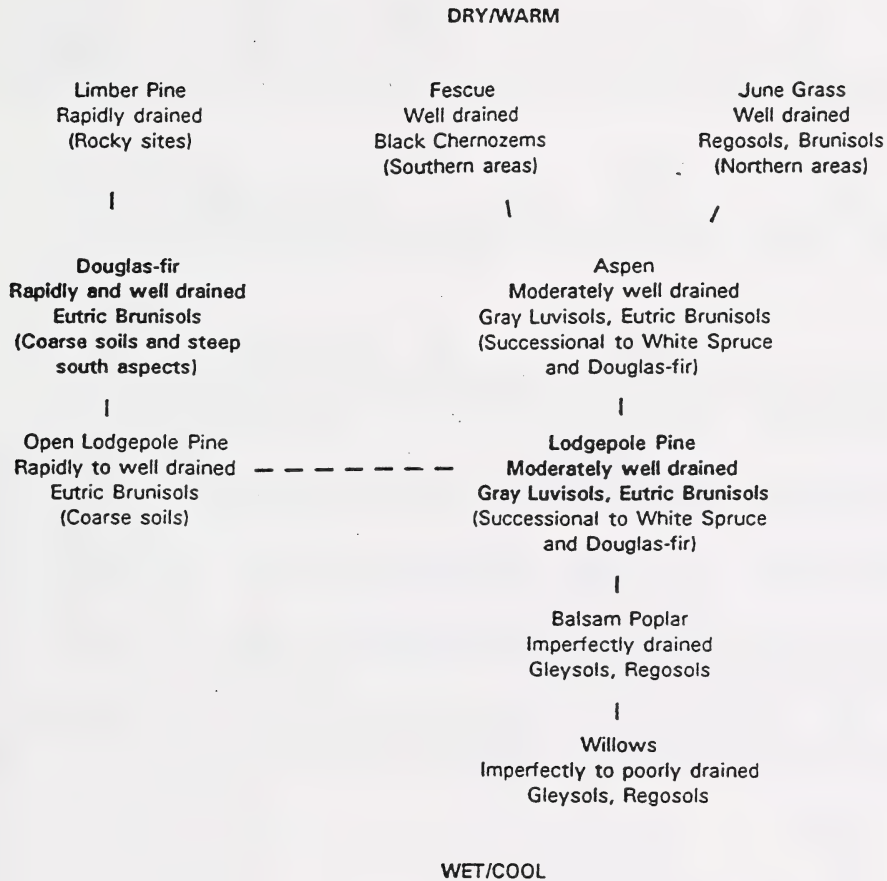


Figure 4: Ecological sequence of the plant communities in the Montane subregion along an environmental gradient (Strong 1992)

Table 4. Conifer, Mixedwood and Deciduous community types in the Montane subregion.

Community number	Community type	Grass	Forb	Shrub	Productivity (kg/ha)	Moisture	Drainage	Carrying Capacity (ha/AUM)
Conifer community types								
E1	Pf/Rough fescue			1500*		Subxeric	Rapidly	1.2
E2	Pf-Fd/Juniper/Bearberry			350*		Subxeric	Rapidly	5.3(non-use)
E3	PI/Bearberry-Juniper	146	225	445		Subxeric	Rapidly	2.2(non-use)
E4	Sw-PI/Alder/Bearberry			850*		Subxeric	Rapidly	2.1
E5	PI/Bufaloberry/Pinegrass	80	282	50	412	Submesic	Rapidly	Non-use
E6	Fd/Hairy wildrye	168	133	53	355	Submesic	Rapidly	5.1
E7	PI/Low bilberry/Hairy wildrye	108	32	50	190	Mesic	Well	Non-use
E8	PI/White meadowsweet	139	184	267	591	Submesic	Well	Non-use
E9	PI/Pinegrass	243	252	102	598	Mesic	Well	3.0
E10	Sw-Fd/White meadowsweet	108	146	111	385	Mesic	Well	Non-use
E11	PI/Moss	243	433	30	706	Mesic	Well	2.7
E12	Sw/Moss	38	112	9	153	Mesic	Well	Non-use
E13	PI/Thimbleberry	317	573	282	1198	Mesic	Well	1.5
E14	PI/Thimbleberry/Beargrass	4	856	1010	1870	Submesic	Rapidly	Non-use
E15	PI/River alder-Thimbleberry				800*	Subhygric	Mod. Well	Non-use
E16	Sw/Thimbleberry	18	130	100	248	Mesic	Well	Non-use
E17	Sb-Lt/Labrador tea			500*		Subhygric	Poorly	Non-use
Castle								
E18	Se/Grouseberry	430	484	156	1064	Mesic	Well	Non-use
E19	Se/Moss	55	212	62	329	Mesic	Well	Non-use
E20	Fa-PI-Sw/White meadowsweet/Pinegrass	509	537	172	1222	Mesic	Rapidly	1.5
E21	Fa-Se/Heart lv'd amica	32	221	264	517	Mesic	Well	Non-use
E22	Se/Clover-Oxeye daisy			400*		Mesic	Well	4.5

Table 4. Continued

Table 4. Continued	Community number	Community type	Grass	Forb	Shrub	Productivity (kg/ha)	Moisture	Drainage	Carrying Capacity (ha/AUM)	
	Mixedwood community types									
	F1	Aw-Fd/Bearberry				600*	Submesic	Rapidly	3.0	
	F2	Sw-Pi/Yellow Mtn. avens	152	252	40	444	Submesic	Rapidly	Non-use	
	F3	Aw-Pi/Bufaloberry/Hairy wildrye				350*	Submesic	Rapidly	Non-use	
	F4	Aw-Pi/Pinegrass	600	384		984	Mesic	Well	1.8	
	F5	Aw-Sw/Blueberry	330	46	48	424	Mesic	Well	Non-use	
	F6	Aw-Fd/White meadowsweet				800*	Mesic	Well	2.3	
	F7	Aw-Pb-Sw/Pinegrass	122	282	28	412	Mesic	Well	4.4	
	F8	Aw-Fa/Snowberry/Pinegrass	152	210	754	1116	Mesic	Well	1.6	
	F9	Pl-Aw/Snowberry/Kentucky bluegrass	668	774	506	1948	Mesic	Well	0.9	
	F10	Aw-Fa-Se/Timothy	1328	696	232	2256	Mesic	Well	0.8	
	F11	Spruce-Pb/Snowberry	188	681	237	1016	Subhygric	Well	1.8	
	F12	Sw-Aw/Scouring rush				800*	Subhygric	Mod. Well	Non-use	
	Deciduous community types									
	G1	Aw/Bearberry/Rough fescue	694	61	51	856	Submesic	Well	2.1	
	G2	Aw/Rose/Hairy wildrye	398	222	32	652	Mesic	Well	2.8	
	G3	Aw/Hairy wildrye	836	1228	0	2064	Mesic	Well	0.9	
	G4	Aw/White meadowsweet/Pinegrass	425	531	190	1146	Mesic	Well	1.6	
	G5	Aw/Rose/Pinegrass	711	506	61	1278	Mesic	Well	1.4	
	G6	Aw/Pinegrass-Kentucky bluegrass	2402	884	0	3286	Mesic	Well	0.6	
	G7	Aw/Timothy-Kentucky bluegrass	995	59		1054	Mesic	Well	1.7	
	G8	Aw/Snowberry-Saskatoon	390	566	335	1291	Mesic	Well	1.4	
	G9	Aw/Snowberry/Kentucky bluegrass	606	749	354	1709	Mesic	Well	1.1	
	G10	Aw/Thimbleberry	432	356	338	1126	Subhygric	Mod. Well	1.6	
	G11	Aw/Cow parsnip	492	952	60	1504	Subhygric	Mod. Well	1.2	
	G12	Pb/Thimbleberry	36	1234	684	1954	Subhygric	Mod. Well	0.9	

Table 4 continued

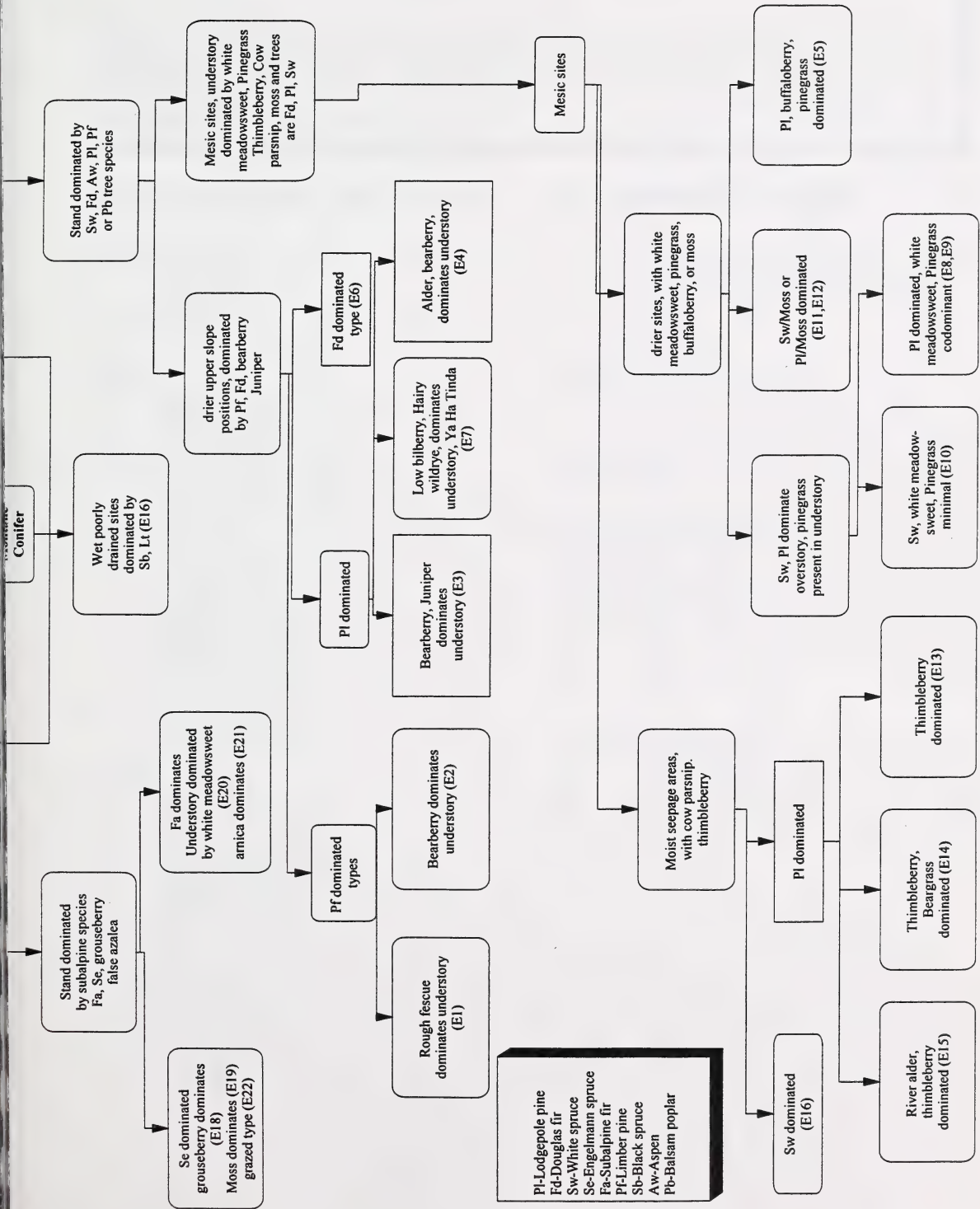
Community number	Community type	Productivity (kg/ha)			Moisture	Drainage	Carrying Capacity (ha/AUM)
		Grass	Forb	Shrub	Total		
G13	Pb/Cow parsnip/Kentucky bluegrass	4	856	1010	1870*	Mod. Well	1.0
G14	Pb/Snowberry	333	483	893	1760	Well	1.0
G15	Aw/Birch-Willow	804	452	622	1878	Mod. Well	Non-use

*estimate

MONTANE SUBREGION
CONIFEROUS COMMUNITY TYPES



Photo 8: Conifer: This is a Douglas-fir-White spruce community type. Where the canopy opens up, grasses are fairly abundant and provide good forage for wildlife and livestock. In the absence of disturbance, this site will likely succeed to white spruce.



Key to coniferous community types of the Montane

E1: Pf/Rough fescue
(*Pinus flexilis*/*Festuca scabrella*)

n=1 This community type was described on a steep, west-facing slope with a subxeric moisture regime. The high cover of rough fescue distinguishes this community from other, more typical limber pine dominated community types. This community probably has deeper soils and is likely protected to some extent from the dry, desiccating winds that are normally associated with limber pine community types (Corns and Achuff 1982). These conditions would favour the growth of rough fescue.

PLANT COMPOSITION **CANOPY COVER (%)**

TREES

LIMBER PINE (<i>Pinus flexilis</i>)	25
DOUGLAS-FIR (<i>Pseudotsuga menziesii</i>)	4

SHRUBS

SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	5
CREeping JUNIPER (<i>Juniperus horizontalis</i>)	2
BRISTLY BLACK CURRANT (<i>Ribes lacustre</i>)	1

FORBS

GOLDEN BEAN (<i>Thermopsis rhombifolia</i>)	4
COMMON YARROW (<i>Achillea millefolium</i>)	1
PASTURE SAGEWORT (<i>Artemisia frigida</i>)	1
WILD BERGAMOT (<i>Monarda fistulosa</i>)	1

GRASSES

ROUGH FESCUE (<i>Festuca scabrella</i>)	95
SLENDER WHEAT GRASS (<i>Agropyron trachycaulum</i>)	1
PARRY OAT GRASS (<i>Danthonia parryi</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC (3.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1475 M

SOIL DRAINAGE: RAPIDLY

SLOPE: 40%

ASPECT: WEST

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

TOTAL 1500 KG/HA*

(*ESTIMATED)

SUGGESTED STOCKING RATE
1.2 HA/AUM

E2: Pf-Fd/Juniper/Bearberry

(*Pinus flexilis*-*Pseudotsuga menziesii*/*Juniperus communis*/*Arctostaphylos uva-ursi*)

n=5 This community type occurs on steep, exposed ridge tops and upper slope positions within the montane subregion. It is characterized by dry site conditions and exposure to westerly winds. Soils are often shallow to bedrock (Archibald et al 1996). This community often forms an edaphic climax on these sites. Limber pine is normally associated with high elevations or timberline where it attains a Krummholz form (Kuchar 1973). However, the montane regions of Southwestern Alberta are found at the northern limits of the range for limber pine, thus they can generally be found at the lower elevations between pairie and coniferous forest. Limber pine, bearberry, juniper and the other associated species of this community type are all well adapted to the low moisture levels, high light intensity, heat and low soil nutrient levels which occur on these erosional, south-facing scarps (Kuchar 1973). Utilization of this site by livestock is often difficult because of the steep slope. These sites are generally considered non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

DOUGLAS-FIR (<i>Pseudotsuga menziesii</i>)	11
LIMBER PINE (<i>Pinus flexilis</i>)	18
LODGEPOLE PINE (<i>Pinus contorta</i>)	2

SHRUBS

GROUND JUNIPER (<i>Juniperus horizontalis</i>)	3
COMMON JUNIPER (<i>Juniperus communis</i>)	5
SASKATOON (<i>Amelanchier alnifolia</i>)	3

FORBS

CUT LV'D ANEMONE (<i>Anemone multifida</i>)	3
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	1
BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	20
NODDING ONION (<i>Allium cernuum</i>)	1

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	2
ROUGH FESCUE (<i>Festuca scabrella</i>)	4
PINEGRASS (<i>Calamagrostis rubescens</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC (3.0)

NUTRIENT REGIME (MEAN): SUBMESOTROPHIC TO MESOTROPHIC (3.0)

ELEVATION: 1518(980-1845) M

SLOPE: 6(0-30)%

ASPECT: SOUTHERLY

SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

TOTAL 350 KG/HA*

(*ESTIMATED)

STOCKING RATE
5.3 HA/AUM OR 12.6 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

E3: Pl/Bearberry-Juniper

(*Pinus contorta*/*Arctostaphylos uva-ursi*-*Juniperus spp.*)

n=5 This community type is similar to the Limber pine-Douglas-fir/Juniper/Bearberry community type previously described, but occurs on slightly richer and better developed soils. Dry site conditions from south exposures or coarse-textured soils are characteristic of this community type (Archibald et al. 1996). The dry site conditions limit the amount of forage this site can produce and the steep slope limits access to livestock. As a result, this community type would be considered non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LIMBER PINE (<i>Pinus flexilis</i>)	1
DOUGLAS-FIR (<i>Pseudotsuga menziesii</i>)	3
LODGEPOLE PINE (<i>Pinus contorta</i>)	31

SHRUBS

COMMON BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	21
JUNIPER (<i>Juniperus spp.</i>)	13
SASKATOON (<i>Amelanchier alnifolia</i>)	1
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
CANADA BUFFALOBERRY (<i>Shepherdia canadensis</i>)	4

FORBS

NODDING ONION (<i>Allium cernuum</i>)	1
CUT-LEAVED ANEMONE (<i>Anemone multifida</i>)	1
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	3
YELLOW HEDYSARUM (<i>Hedysarum sulphurescens</i>)	3

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	1
SEDGE (<i>Carex spp.</i>)	2
PINEGRASS (<i>Calamagrostis rubescens</i>)	7

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):	XERIC TO MESIC
NUTRIENT REGIME (MEAN):	SUBMESOTROPHIC
ELEVATION RANGE (MEAN):	1671(1460-2010) M
ASPECT:	SOUTH TO WEST
SLOPE:	52(14-80)% (steep slopes and hill crests)
SOIL DRAINAGE:	RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	146(0-292)
FORB	225(174-276)
SHRUB	445(168-722)
TOTAL	816(634-998)

STOCKING RATE
2.2 HA/AUM OR 5 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

Introduction

The purpose of this document is to provide a comprehensive overview of the project's objectives, scope, and timeline.

The project aims to develop a new software application that will streamline the workflow of our department. The application will be designed to be user-friendly and efficient, allowing users to complete tasks more quickly and accurately. The project is expected to be completed by the end of the year.

Project Objectives

The primary objective of the project is to develop a software application that will streamline the workflow of our department.

The secondary objective is to ensure that the application is user-friendly and efficient.

The tertiary objective is to complete the project by the end of the year.

The project will be managed by the Project Manager, who will be responsible for ensuring that the project is completed on time and within budget.

The project will be supported by the IT Department, who will be responsible for providing technical assistance and support.

Project Scope

The project will cover the development of a software application that will streamline the workflow of our department.

The project will also cover the testing and deployment of the application.

The project will not cover the development of a new hardware device.

The project will not cover the development of a new database system.

The project will not cover the development of a new user interface.

Project Timeline

The project is expected to be completed by the end of the year.

The project will be managed by the Project Manager, who will be responsible for ensuring that the project is completed on time and within budget.

Project Budget

The project budget is estimated to be \$100,000.

The budget will cover the development of the software application, the testing and deployment of the application, and the support of the project.

The budget will also cover the salaries of the project team members.

The budget will not cover the development of a new hardware device.

The budget will not cover the development of a new database system.

The budget will not cover the development of a new user interface.

The budget will not cover the development of a new software application.

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The budget will not cover the development of a new user interface.

E4: Sw-Pl/Alder/Bearberry
(Picea glauca-Pinus contorta/Alnus crispa/Arctostaphylos uva-ursi)

n=1 This community was described by Corns and Achuff (1982) in the Banff and Jasper Mountain ecodistricts. It occupies rapidly drained, level areas with a poor nutrient regime. This community is similar to Archibald et al's. (1996) bearberry Aw-Sw-Pl ecosite phase. Succession will generally be to white spruce, but succession rates will be slow because of the dry site conditions. The presence of green alder indicates there is a higher moisture content at some point in the growing season, making this community type slightly moister than the modal bearberry ecosite. The high tree cover and poor nutrient status would limit the amount of forage for domestic livestock. This community would be rated non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	25
SUBAPINE -FIR (<i>Abies lasiocarpa</i>)	3
WHITE SPRUCE (<i>Picea glauca</i>)	32
ASPEN (<i>Populus tremuloides</i>)	12

SHRUBS

GROUND JUNIPER (<i>Juniperus communis</i>)	12
GREEN ALDER (<i>Alnus crispa</i>)	82
SASKATOON (<i>Amelanchier alnifolia</i>)	32
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	30
TALL BILBERRY (<i>Vaccinium caespitosum</i>)	22

FORBS

BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	12
TWIN FLOWER (<i>Linnaea borealis</i>)	2

GRASSES

MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	30
TIMOTHY (<i>Phleum pratense</i>)	20

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC (3.0)
 NUTRIENT REGIME (MEAN): MESOTROPHIC (2.0)
 ELEVATION RANGE (MEAN): 1360 M
 ASPECT: SOUTH TO SOUTHEAST
 SLOPE: 5(5-15)%
 SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
 TOTAL 850 KG/HA*
 (*ESTIMATED)

SUGGESTED STOCKING RATE 2.1 HA/AUM OR 5.3 AC/AUM
--

E5: Pl/Bufaloberry/Pinegrass

(*Pinus contorta*/Shepherdia canadensis/Calamagrostis rubescens)

n=4 This community type occurs on submesic, well drained, south and west-facing slopes. It is situated in slightly lower slope positions and therefore has better developed soils than the Limber pine and bearberry-dominated community types previously described. Archibald et al. (1996) described this community type as being part of the Canada buffaloberry-hairy wildrye ecosite. They felt this ecosite to be relatively dry for the subregion, but not as dry as the limber pine and bearberry ecosites. This community type has only sparse understory vegetation and therefore has only limited forage for domestic livestock. It should be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	52
BALSAM POPLAR (<i>Populus balsamifera</i>)	1

SHRUBS

CANADA BUFFALOBERRY (<i>Shepherdia canadensis</i>)	19
SHINING WILLOW (<i>Salix lucida</i>)	5
PRICKLY ROSE (<i>Rosa acicularis</i>)	1

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	4
SHOWY ASTER (<i>Aster conspicuus</i>)	11
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	5
FIREWEED (<i>Epilobium angustifolium</i>)	2

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	15
HAIRY WILD RYE (<i>Elymus innotatus</i>)	23

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC TO MESIC

NUTRIENT REGIME (MEAN): SUBMESOTROPHIC

ELEVATION: 1544(1502-1580) M

ASPECT: SOUTHERLY

SLOPE: 17(5-30)%

SOIL DRAINAGE: RAPIDLY TO MODERATELY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	80
FORB	282
SHRUB	50
TOTAL	412

SUGGESTED STOCKING RATE
4.4 HA/AUM OR 9.9 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

THE UNIVERSITY OF CHICAGO

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E6: Fd/Hairy wildrye
(*Pseudotsuga menziesii*/*Elymus innovatus*)

n=8 This community type occurs on steep, dry sites throughout the subregion. Douglas fir is usually restricted to steep, south facing slopes, shallow rocky soils and coarse-textured outwash in valley bottoms (Strong 1992). The soils of this type are not as rich as the previously described PI/Buffaloberry, but are better than the bearberry and limber pine dominated ecosites. This community has a high cover of Douglas fir and a very sparse understory. Consequently, there is little forage available for domestic livestock. As a result, this community type would be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	1
DOUGLAS FIR (<i>Pseudotsuga menziesii</i>)	60

SHRUBS

PRICKLY ROSE (<i>Rosa acicularis</i>)	3
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	6
COMMON JUNIPER (<i>Juniperus communis</i>)	2

FORBS

SHOWY ASTER (<i>Aster conspicuus</i>)	5
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	2
STRAWBERRY (<i>Fragaria virginiana</i>)	4
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	5
CREAM-COLORED VETCHLING (<i>Lathyrus ochroleucus</i>)	1

GRASSES

HAIRY WILDRYE (<i>Elymus innovatus</i>)	6
PINEGRASS (<i>Calamagrostis rubescens</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBXERIC-MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (4.0)

ELEVATION: 1586(1460-1765) M

ASPECT: VARIABLE

SLOPE: 24(3-51)%

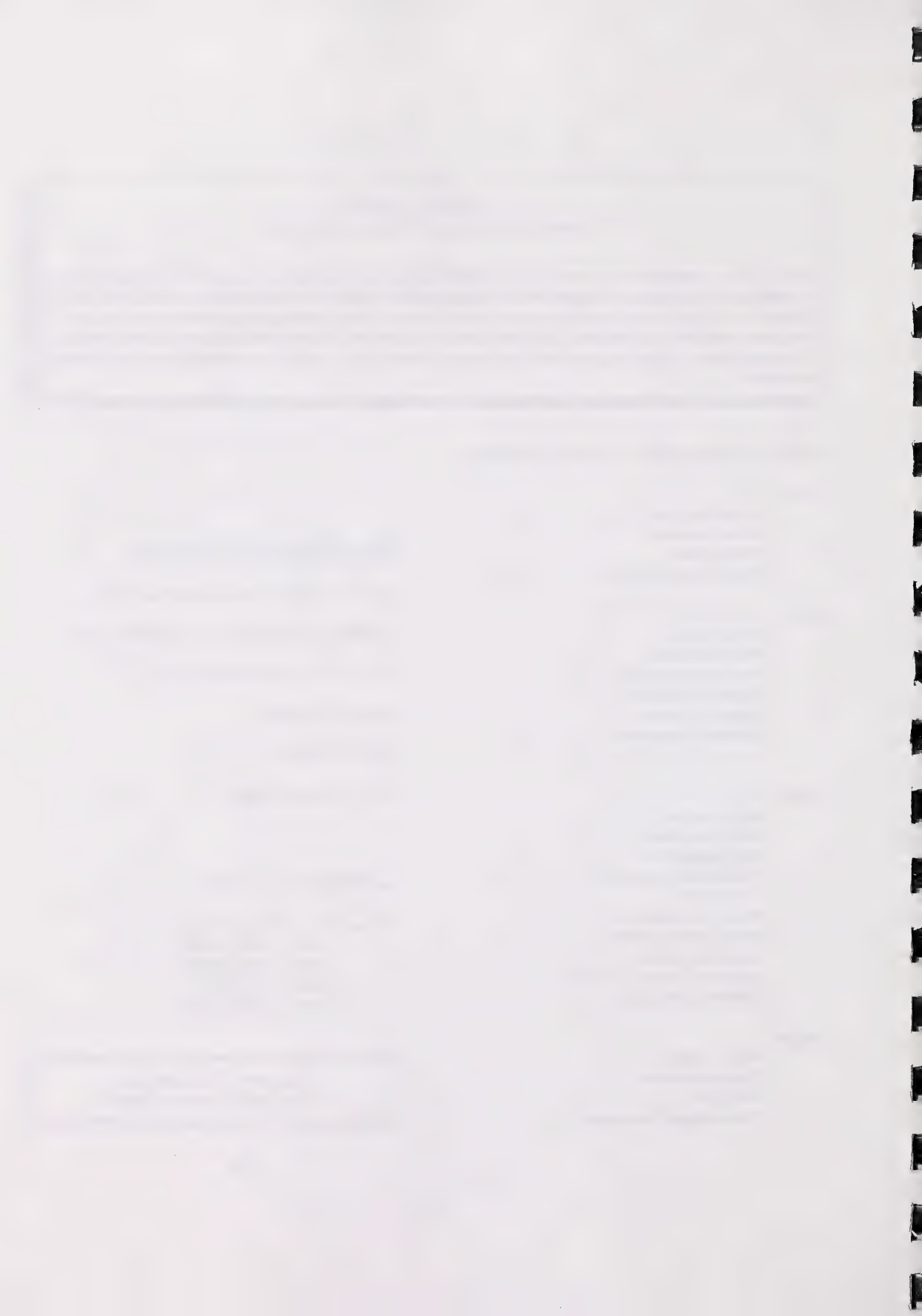
SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	168(68-420)
FORB	133(12-266)
SHRUB	53(2-134)
TOTAL	355(92-708)

SUGGESTED STOCKING RATE
5.1 HA/AUM OR 11 AC/AUM



E7: Pl/Low bilberry/Hairy wildrye
(*Pinus contorta/Vaccinium cespitosum/Elymus innovatus*)

n=1 This community is typical of the pine dominated community types adjacent to the grasslands within the Ya Ha Tinda area. They tend to be dry sites, that are well drained with poor to medium nutrient regimes. Forage production on these sites tends to be low because of the closed canopy cover. Succession in the absence of disturbance will be to white spruce.

PLANT COMPOSITION **CANOPY COVER (%)**

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	37
WHITE SPRUCE (<i>Picea glauca</i>)	5

SHRUBS

LOW BILBERRY (<i>Vaccinium cespitosum</i>)	14
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	6

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	1
SMALL LEAVED EVERLASTING (<i>Antennaria parviflora</i>)	1
CUT LEAVED ANEMONE (<i>Anemone multifida</i>)	1

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	4
ROUGH FESCUE (<i>Festuca scabrella</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBMESIC-MESIC

NUTRIENT REGIME (MEAN):
MESOTROPHIC

ELEVATION:
1600 M

ASPECT:
VARIABLE

SOIL DRAINAGE:
RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
GRASS 108
FORB 32
SHRUB 50
TOTAL 190

SUGGESTED STOCKING RATE(HORSES)
7.1 HA/AUM
RECOMMENDED STOCKING RATE
NON-USE

E8: PI/White meadowsweet
(*Pinus contorta/Spiraea betulifolia*)

n=6 This community is one of several community types which represent the mesic/medium ecosite for the Montane subregion. These sites can be dominated by Douglas fir, white spruce, aspen or lodgepole pine. The understory can be dominated by white meadowsweet, pinegrass or feather moss depending on the successional status of the stand. In the vicinity of the Crowsnest Pass creeping mahonia is also common on these sites (Archibald et al. 1996). White meadowsweet is well adapted to growing on dry rocky slopes (MacKinnon et al. 1992). The presence of a high cover of white meadowsweet may indicate slightly drier conditions and shallower soils than a community dominated by pinegrass. This community type produces little forage for domestic livestock and should be considered non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	66
ASPEN (<i>Populus tremuloides</i>)	1

SHRUBS

CANADA BUFFALOBERRY (<i>Shepherdia canadensis</i>)	1
GROUND JUNIPER (<i>Juniperus communis</i>)	1
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	18
THIMBLEBERRY (<i>Rubus parviflora</i>)	8

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	4
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	4
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	4
SHOWY ASTER (<i>Aster conspicuus</i>)	3
TALL BILBERRY (<i>Vaccinium membranaceum</i>)	9

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	1
PINEGRASS (<i>Calamagrostis rubescens</i>)	10

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC (4.5)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION RANGE (MEAN): 1633(1468-1798) M

ASPECT: SOUTH TO SOUTHWEST

SLOPE: 24(10-53)%

SOIL DRAINAGE: WELL TO RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	139(48-306)
FORB	184(36-4345)
SHRUB	267(92-408)
TOTAL	591(404-1006)

SUGGESTED STOCKING RATE
3.1 HA/AUM OR 6.9 AC/AUM
RECOMMENDED STOCKING RATE
NON-USE

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Name	Address
John Doe	123 Main St, New York, NY 10001
Jane Smith	456 Elm St, Los Angeles, CA 90001
Bob Johnson	789 Oak St, Chicago, IL 60601
Alice Brown	101 Pine St, San Francisco, CA 94101
Charlie Davis	202 Cedar St, Boston, MA 02101
Diana Evans	303 Birch St, Seattle, WA 98101
Frank Green	404 Spruce St, Denver, CO 80201
Grace Hall	505 Willow St, Portland, OR 97201
Henry King	606 Ash St, San Diego, CA 92101
Ivy Lee	707 Hickory St, Austin, TX 78701
Jack Miller	808 Sycamore St, Minneapolis, MN 55401
Karen Wilson	909 Magnolia St, Philadelphia, PA 19101
Leo White	1010 Dogwood St, San Jose, CA 95101

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E9: Pl/Pinegrass
(*Pinus contorta*/*Calamagrostis rubescens*)

n=4 This community is dominated by a lodgepole pine overstory and an understory of pinegrass. Succession will be to white spruce or Douglas fir, but the extensive fire and disturbance history in the Montane has resulted in a predominance of lodgepole pine and Douglas fir (Archibald et al. 1996). This community is also very similar to the previously described Pl/White meadowsweet community type, but the high cover of pinegrass and low cover of white meadowsweet may indicate slightly moister, better developed soils. Pinegrass is generally unpalatable to livestock, but if it is grazed early in the spring they will utilize it as a forage source. The forage productivity of this community type is quite low. As a result, this community should be rated as secondary or non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	47
WHITE SPRUCE (<i>Picea glauca</i>)	8

SHRUBS

ROSE (<i>Rosa acicularis</i>)	3
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	2
CANADA BUFFALOBERRY (<i>Shepherdia canadensis</i>)	2
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	1

FORBS

SHOWY ASTER (<i>Aster conspicuus</i>)	7
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	5
TWINFLOWER (<i>Linnaea borealis</i>)	11
STRAWBERRY (<i>Fragaria virginiana</i>)	3

GRASSES

HAIRY WILDRYE (<i>Elymus innovatus</i>)	10
PINEGRASS (<i>Calamagrostis rubescens</i>)	13

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC (5.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC TO PERMESOTROPHIC

SOIL DRAINAGE: WELL TO RAPIDLY

ASPECT: SOUTHERLY

SLOPE: 14(2-30)%

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	243(80-304)
FORB	252(124-566)
SHRUB	102(42-182)
TOTAL	598(276-896)

STOCKING RATE

3.0 HA/AUM OR 6.7 AC/AUM

E10: Sw-Fd/White meadowsweet
(*Picea glauca*-*Pseudotsuga menziesii*/*Spiraea betulifolia*)

n=2 This community type is successional more advanced than the Pl/White meadowsweet and Pl/Pinegrass community types previously described. Archibald et al. (1996) described the successional changes from pine to white spruce and douglas fir on these mesic/medium sites. As succession occurs there is less light reaching the forest floor and understory vegetation becomes very sparse. As a result, there is little forage for domestic livestock underneath these forested stands. This community type would be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

ENVIRONMENTAL VARIABLES

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	33
DOUGLAS FIR (<i>Pseudotsuga menziesii</i>)	20
LODGEPOLE PINE (<i>Pinus contorta</i>)	8

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC (5.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1575(1550-1660)M

ASPECT: VARIABLE

SHRUBS

WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	6
THIMBLEBERRY (<i>Rubus parviflorus</i>)	5

SLOPE: 33(30-35)%

SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORBS

WILD STRAWBERRY (<i>Fragaria virginiana</i>)	1
SHOWY ASTER (<i>Aster conspicuus</i>)	2
FIREWEED (<i>Epilobium angustifolium</i>)	1
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	10
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	1
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	6
BUNCHBERRY (<i>Cornus canadensis</i>)	16

FORAGE PRODUCTION IN KG/HA

GRASS	108(94-122)
FORB	146(138-154)
SHRUB	111(56-166)
TOTAL	385(316-414)

STOCKING RATE
4.6 HA/AUM OR 10.5 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

GRASSES

HAIRY WILDRYE (<i>Elymus innovatus</i>)	2
PINEGRASS (<i>Calamagrostis rubescens</i>)	1

E11: PI/Moss
(*Pinus contorta*/Moss spp.)

n=6 This community type is similar to the previously described PI/Pinegrass and PI/White meadowsweet communities, but represents further succession. This community was described on moister sites, which probably escaped fire and disturbance, allowing succession to occur. Continued succession in the absence of disturbance will likely be to the Sw/Moss dominated community type. This community type is moderately productive for domestic livestock. The higher moisture conditions favour the growth of fireweed and aster spp. These species are moderately palatable to livestock. This community type would be rated as secondary range for domestic livestock.

PLANT COMPOSITION CANOPY COVER(%)

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	6
LODGEPOLE PINE (<i>Pinus contorta</i>)	43

SHRUBS

ROSE (<i>Rosa acicularis</i>)	T
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	T
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	2

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	21
FIREWEED (<i>Epilobium angustifolium</i>)	10
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	16
DANDELION (<i>Taraxacum officinale</i>)	6
WESTERN MEADOW RUE (<i>Thalictrum occidentale</i>)	4

GRASSES

SEDGE (<i>Carex spp.</i>)	11
HAIRY WILDRYE (<i>Elymus innovatus</i>)	8

MOSS 46

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1742(1707-1798)m

ASPECT: NORTHERLY

SLOPE: 1%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 243(0-570)

FORB 433(0-832)

SHRUB 30(0-96)

TOTAL 706(136-1402)

STOCKING RATE

2.7 HA/AUM

SUGGESTED STOCKING RATE

NON-USE

E12: Sw/Moss
(*Picea glauca*/Moss spp.)

n=7 This community type is similar to the previously described Sw-Fd/White meadowsweet community, but represents further succession. This community was described on northerly aspects, which probably escaped fire and disturbance, allowing succession to occur. Note as succession occurs there is a corresponding drop in forage productivity from 500-600 kg/ha in the P1 community types to 150 kg/ha in this community type. This community type would be rated as non-use for domestic livestock.

PLANT COMPOSITION **CANOPY COVER (%)**

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	64
ASPEN (<i>Populus tremuloides</i>)	2

SHRUBS

ROSE (<i>Rosa acicularis</i>)	2
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	T

FORBS

HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	6
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	T
SHOWY ASTER (<i>Aster conspicuus</i>)	1
TWINFLOWER (<i>Linnaea borealis</i>)	8
WINTERGREEN (<i>Pyrola asarifolia</i>)	1

GRASSES

SEDGE (<i>Carex spp.</i>)	2
HAIRY WILDRYE (<i>Elymus innovatus</i>)	1

MOSS 65

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC

NUTRIENT REGIME (MEAN): SUBMESOTROPHIC TO MESOTROPHIC

ELEVATION: 1442(1330-1500)M

ASPECT: NORTHERLY

SLOPE: 12(0-35)%

SOIL DRAINAGE: WELL TO RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	38(2-90)
FORB	112(60-210)
SHRUB	9(0-20)
TOTAL	153(66-300)

STOCKING RATE

11.9 HA/AUM OR 26.8 AC/AUM

SUGGESTED STOCKING RATE

NON-USE

E13: PI/Thimbleberry
(*Pinus contorta/Rubus parviflorus*)

n=5 Nutrient rich seepage occurs on this community type at some point in the growing season favouring the growth of thimbleberry. On these sites thimbleberry is very common south of the Crowsnest Pass and is generally replaced by cow parsnip north of the Pass. Succession on these sites will be from aspen to pine and then to white spruce. Forage productivity on these sites is generally quite high because of the favourable moisture and nutrient conditions. Thimbleberry is generally unpalatable to livestock, but if the site has an abundance of cow parsnip it may be extensively utilized. This community type should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	48
WHITE SPRUCE (<i>Picea glauca</i>)	2

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	32
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	9

FORBS

HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	5
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	2
STRAWBERRY (<i>Fragaria virginiana</i>)	2
FIELD HORSETAIL (<i>Equisetum arvense</i>)	6
COW PARSNIP (<i>Heracleum lanatum</i>)	3

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	4
BROME (<i>Bromus vulgaris</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC(4.0)

ELEVATION:1584(1478-1661) M

SLOPE: 22(0-37)%

ASPECT: VARIABLE

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FOREAGE PRODUCTION IN KG/HA

GRASS	317(132-1132)
FORB	573(142-1152)
SHRUB	282(0-616)
TOTAL	1198(398-1688)

STOCKING RATE
1.5 HA/AUM OR 3.4 AC/AUM

E14: PI/Thimbleberry/Beargrass
(*Pinus contorta*/*Rubus parviflorus*/*Xerophyllum tenax*)

n=1 This community type is very similar to the PI/Thimbleberry community type previously described, but contains a high cover of beargrass. Archibald et al. (1996) recognized these beargrass-dominated community types in the extreme southern portion of the subregion. Beargrass is well suited to growing on hillsides and dry subalpine meadows and appears to indicate the transition from the lower Montane subregion to the upper Subalpine subregion. The tender seed pods are often eaten by small rodents and elk. In the winter Mountain goats often eat the leaves (Craighead et al. 1963). The tough leaves of beargrass are unpalatable to livestock.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	85
WHITE SPRUCE (<i>Picea glauca</i>)	3

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	34
WILLOW (<i>Salix spp.</i>)	19
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	17

FORBS

BEARGRASS (<i>Xerophyllum tenax</i>)	54
GROUSEBERRY (<i>Vaccinium scoparium</i>)	23
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	9
EARLY BLUE VIOLET (<i>Viola adunca</i>)	3
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	9

GRASSES

BROME (<i>Bromus vulgaris</i>)	4
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1494 M

SLOPE: 15%

ASPECT: SOUTHWEST

SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	4
FORB	856
SHRUB	1010
TOTAL	1870

STOCKING RATE
1.0 HA/AUM OR 2.2 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

E15: PI/River alder-Thimbleberry
(*Pinus contorta*/*Alnus tenuifolia*-*Rubus parviflorus*)

n=1 This community type is very similar to the previously described PI/Thimbleberry and PI/Thimbleberry/Beargrass community types, but contains river alder. River alder tends to be found growing on nutrient seepage areas with high water tables. This community type is probably moister than the other PI/Thimbleberry dominated types, but dries out at some time during the growing season which favours the growth of thimbleberry. The high cover of alder limits the light reaching the forest floor and results in low production of grass and forbs. The majority of the total production comes from alder which is unpalatable and generally inaccessible to livestock. Consequently, this community type would be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR (<i>Populus balsamifera</i>)	1
LODGEPOLE PINE (<i>Pinus contorta</i>)	10

SHRUBS

RIVER ALDER (<i>Alnus tenuifolia</i>)	30
THIMBLEBERRY (<i>Rubus parviflorus</i>)	15
GREEN ALDER (<i>Alnus crispa</i>)	10
ROSE (<i>Rosa acicularis</i>)	10

FORBS

DEWBERRY (<i>Rubus pubescens</i>)	10
FIELD HORSETAIL (<i>Equisetum arvense</i>)	5
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	1

GRASSES

MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	2
HAIRY WILDRYE (<i>Elymus innovatus</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC (2.0)

ELEVATION: 1300 M

SLOPE: 12%

ASPECT: NORTH

SOIL DRAINAGE: MODERATELY WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
TOTAL 800 KG/HA*

(*ESTIMATED)

STOCKING RATE
2.2 HA/AUM OR 5.1 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

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(*Picea glauca*/*Rubus parviflorus*)

n=1 This community type is very similar to the PI/Thimbleberry dominated community types previously described, but is successional more advanced. Succession on the thimbleberry dominated ecosystems will be from aspen to pine and then to white spruce (Archibald et al. 1996). The northerly aspect of this particular community type has allowed the site to escape disturbance by fire and succession has occurred to white spruce. Note as succession occurs there is a corresponding drop in forage productivity from 500-600 kg/ha in the PI community types to 250 kg/ha in this community type. This community type would be rated as non-use for domestic livestock.

PLANT COMPOSITION CANOPY COVER (%)

ENVIRONMENTAL VARIABLES

TREES

WHITE SPRUCE
(*Picea glauca*)

75

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

SHRUBS

PRICKLY ROSE
(*Rosa acicularis*)
THIMBLEBERRY

1

ELEVATION:1570M

SLOPE:10%

(*Rubus parviflorus*)

11

ASPECT: NORTH

WHITE MEADOWSWEET
(*Spiraea betulifolia*)

T

SOIL DRAINAGE: WELL

FORBS

SHOWY ASTER
(*Aster conspicuus*)

1

CARRYING CAPACITY

BUNCHBERRY
(*Cornus canadensis*)

12

FORAGE PRODUCTION IN KG/HA

TWINFLOWER

(*Linnaea borealis*)

4

GRASS 18

HEART-LEAVED ARNICA

(*Arnica cordifolia*)

3

FORB 130

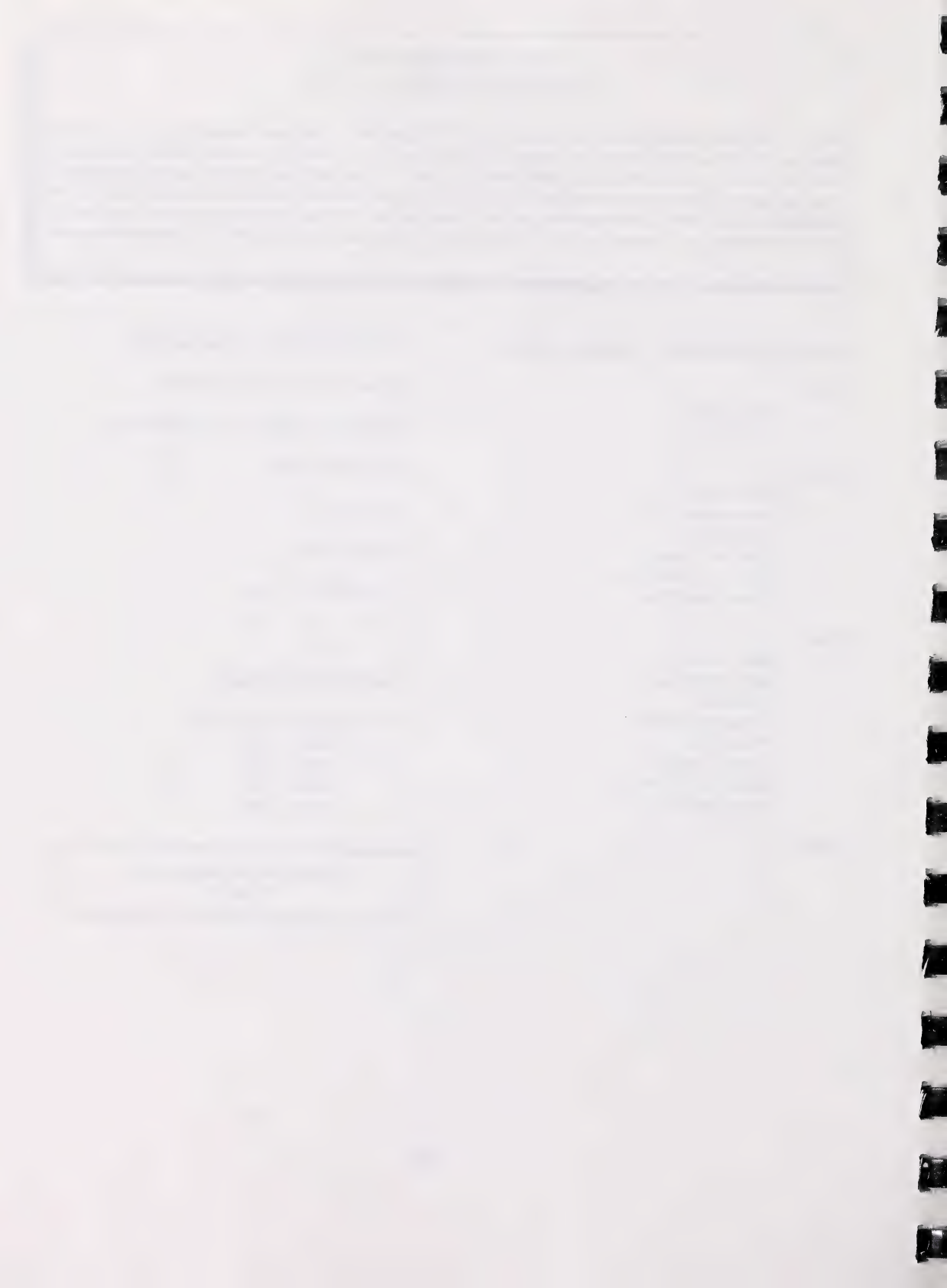
SHRUB 100

TOTAL 248

MOSSES

68

SUGGESTED STOCKING RATE
NON-USE



E17: Sb-Lt/Labrador tea
(*Picea mariana-Larix laricina/Ledum groenlandicum*)

n=1 This community type occurs in association with lowland bog areas. The water table under this type has begun to drop which has allowed succession toward a white spruce-dominated community. Generally, black spruce-larch dominated communities are considered successional mature because of poor drainage, acidic soils and low soil nutrients which prevent succession to white spruce. This community type is likely flooded in the spring, therefore, it may provide a source of water for livestock early in the year. However, due to poor access and the limited number of palatable plants available, this community type would be considered non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BLACK SPRUCE (<i>Picea glauca</i>)	25
WHITE SPRUCE (<i>Picea glauca</i>)	20
LARCH (<i>Larix laricina</i>)	5

SHRUBS

LABRADOR TEA (<i>Ledum groenlandicum</i>)	10
MYRTLE-LEAVED WILLOW (<i>Salix myrtillifolia</i>)	10

FORBS

COMMON BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	5
TWINFLOWER (<i>Linnaea borealis</i>)	5
DWARF SCOURING RUSH (<i>Equisetum scirpoides</i>)	4
COMMON HORSETAIL (<i>Equisetum arvense</i>)	3
NORTHERN COMANDRA (<i>Geocaulon lividum</i>)	2

GRASSES

SHEATHED SEDGE (<i>Carex vaginata</i>)	15
HAIRY WILDRYE (<i>Elymus innovatus</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): SUBMESOTROPHIC

ELEVATION: 1220 M

SOIL DRAINAGE: POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

TOTAL 500 KG/HA*

(*ESTIMATED)

SUGGESTED STOCKING RATE
NON-USE

E18: Se/Grouseberry/Moss
(*Picea engelmannii/Vaccinium scoparium/Moss*)

n=1 This community represents a subalpine forested community type with mesic moisture regimes and medium nutrient regimes. Subalpine fir, Englemann spruce, false azalea and grouseberry rarely occur at lower elevations and therefore are characteristic of the subalpine environment. The Castle area of the province is unusual in that the subalpine forested communities can be found at lower montane elevations and the montane grasslands can be found at alpine and subalpine elevations. Clearly there is a strong overlap between the Montane and Subalpine subregions of this area of the province. It is for this reason that the forested community types for the Castle area are described in this guide.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	26
WHITE SPRUCE (<i>Picea glauca</i>)	21

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	4
FALSE AZALEA (<i>Menziesia ferruginea</i>)	3
GROUSEBERRY (<i>Vaccinium scoparium</i>)	15

FORBS

FIREWEED (<i>Epilobium angustifolium</i>)	18
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	68
YELLOW BEARDSTONGUE (<i>Penstemon confertus</i>)	5
SMOOTH ASTER (<i>Aster laevis</i>)	1

GRASSES

NORTHERN REEDGRASS (<i>Calamagrostis inexpansa</i>)	23
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	10

MOSS	50
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC (5.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1530 M

ASPECT: EAST

SLOPE: 10%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	430
FORB	484
SHRUB	156
TOTAL	1064

SUGGESTED STOCKING RATE
NON-USE

E19. Se/Moss
(*Picea engelmannii*/Moss)

n=3 This community type is very similar to the previously described Se/Grouseberry community type, but lacks the cover of grouseberry. Grouseberry is well adapted to growing at higher elevations in the subalpine and is very common at timberline between the subalpine and alpine environments (Willoughby and Smith 1997). The lack of grouseberry in this community type may indicate warmer sites than the previously described Se/Grouseberry community. This community would be rated as non-use for domestic livestock.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	57
BALSAM POPLAR (<i>Populus balsamifera</i>)	11
SUBALPINE FIR (<i>Abies lasiocarpa</i>)	5

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	5
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	15
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	1

FORBS

VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	5
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	1
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	10
CREAM-COLORED VETCHLING (<i>Lathyrus ochroleucus</i>)	1
SHOWY ASTER (<i>Aster conspicuus</i>)	4
BUNCHBERRY (<i>Cornus canadensis</i>)	5

GRASSES

TALL TRisetum (<i>Trisetum canescens</i>)	3
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MOSESSES	17
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC

NUTRIENT REGIME(MEAN): MESOTROPHIC (3.0)

ELEVATION: 1561(1433-1798) M

SLOPE: 14(0-37)%

ASPECT: VARIABLE

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	55(14-82)
FORB	212(56-356)
SHRUB	62(0-108)
TOTAL	329(148-546)

SUGGESTED STOCKING RATE
NON-USE

E20:Fa-Pl-Sw/White meadowsweet/Pinegrass*(Abies lasiocarpa-Pinus contorta-Picea glauca/Spiraea betulifolia/Calamagrostis rubescens)*

n=12 This community is indicative of the overlap between the Subalpine and Montane subregions of the Castle area. The overstory is dominated by subalpine fir a species characteristic of the subalpine environment, but the understory is dominated by white meadowsweet and pinegrass species characteristic of the montane environment. This community type occupies submesic to mesic sites, on moderate slopes with variable aspects. Forage productivity is moderate averaging 1200 kg/ha, but the majority of the understory vegetation is unpalatable. As a result this community should be only rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)**TREES**

SUBALPINE FIR	
<i>(Abies lasiocarpa)</i>	42
WHITE SPRUCE	
<i>(Picea glauca)</i>	25
LODGEPOLE PINE	
<i>(Pinus contorta)</i>	24

SHRUBS

SNOWBERRY	
<i>(Symphoricarpos occidentalis)</i>	7
WHITE MEADOWSWEET	
<i>(Spiraea betulifolia)</i>	6
THIMBLEBERRY	
<i>(Rubus parviflora)</i>	2
FALSE AZALEA	
<i>(Menziesii ferruginea)</i>	3

FORBS

FIREWEED	
<i>(Epilobium angustifolium)</i>	3
WESTERN MEADOW RUE	
<i>(Thalictrum occidentale)</i>	2
WILD STRAWBERRY	
<i>(Fragaria virginiana)</i>	16
CREAM-COLORED VETCHLING	
<i>(Lathyrus ochroleucus)</i>	3
SHOWY ASTER	
<i>(Aster conspicuus)</i>	2

GRASSES

PINEGRASS	
<i>(Calamagrostis rubescens)</i>	14
SEDGE	
<i>(Carex spp.)</i>	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO
SUBMESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1557(1493-1646)M

SLOPE: 11(4-20)%

ASPECT: VARIABLE

SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 509(78-758)

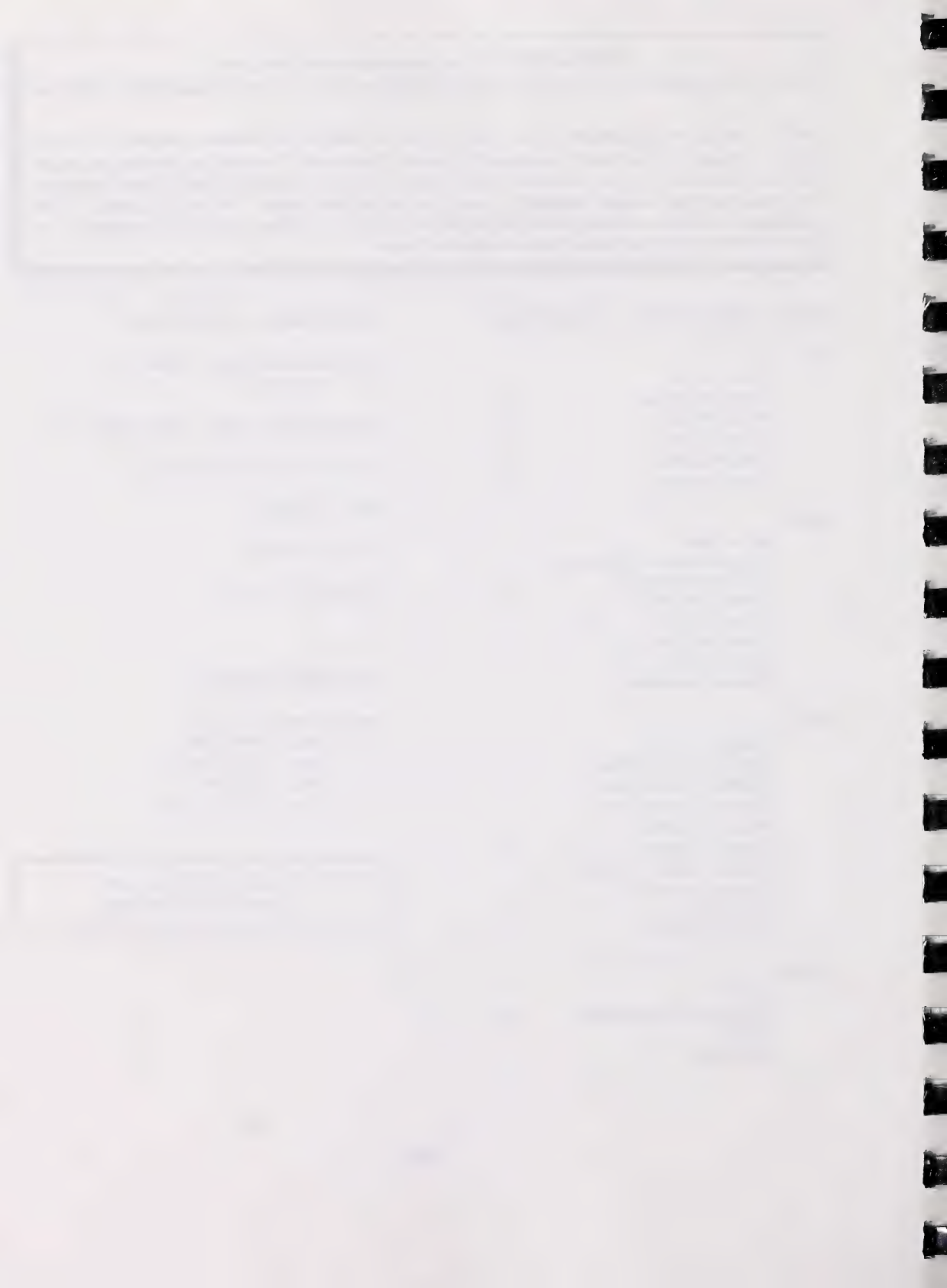
FORB 537(152-910)

SHRUB 172(0-682)

TOTAL 1222(462-1922)

SUGGESTED STOCKING RATE

1.5 HA/AUM 3.3 AC/AUM



E21: Fa-Se/Heart-leaved arnica
(*Abies lasiocarpa*-*Picea engelmannii*/*Arnica cordifolia*)

n=3 This community type is very similar to the Se/Moss community previously described, but contains a high cover of subalpine fir. Succession in the subalpine is from lodgepole pine to Engelmann spruce and subalpine fir (Archibald et al. 1996). This community type appears to represent the climatic climax for sites with subalpine environments in the Castle area of the province. The northerly aspects of the two described sites probably allowed them to escape the recent fire history and undergo succession. As these forested sites succeed towards climax there is very little light reaching the forest floor. As a result, there is little forage for domestic livestock and this community would be rated as non-use

PLANT COMPOSITION CANOPY COVER (%)

TREES

SUBALPINE FIR (<i>Abies lasiocarpa</i>)	55
ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	21

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	2
FALSE AZALEA (<i>Menziesia ferruginea</i>)	23
GREEN ALDER (<i>Alnus crispa</i>)	11

FORBS

HEART- LEAVED ARNICA (<i>Arnica cordifolia</i>)	24
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	3
ONE FLOWERED WINTERGREEN (<i>Moneses uniflora</i>)	2
SUGARSCOOP (<i>Tiarella unifoliata</i>)	2

GRASSES

SEDGE (<i>Carex spp.</i>)	T
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MOSSES

55

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC (5.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1758(1753-1783)M

SLOPE: 25(21-30)%

ASPECT: NORTHERLY

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	32(0-96)
FORB	221(104-240)
SHRUB	264(0-74)
TOTAL	517(104-374)

SUGGESTED STOCKING RATE
NON-USE



E22: Se/Clover-Oxeye daisy
(*Picea engelmannii*/Trifolium repens-*Chrysanthemum leucanthemum*)

n=1 This community type represents a forested community type that has been heavily utilized by livestock. The heavy utilization has allowed clover and oxeye daisy to invade into the understory. Once established oxeye daisy is very invasive and difficult to control. The authors have seen whole fields taken over by this plant species. This plant is unpalatable to livestock so when invasion occurs there is a corresponding drop in forage production.

PLANT COMPOSITION CANOPY COVER (%)

TREES

SUBALPINE FIR (<i>Abies lasiocarpa</i>)	12
ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	11

SHRUBS

SASKATOON (<i>Amelanchier alnifolia</i>)	7
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	6
THIMBLEBERRY (<i>Rubus parviflora</i>)	4

FORBS

OX-EYE DAISY (<i>Chrysanthemum leucanthemum</i>)	17
CLOVER (<i>Trifolium repens</i>)	16
TALL BILBERRY (<i>Vaccinium myrtillus</i>)	8
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	3
TWINFLOWER (<i>Linnaea borealis</i>)	4
DANDELION (<i>Taraxacum officinale</i>)	3

GRASSES

SEDGE (<i>Carex spp.</i>)	4
PINEGRASS (<i>Calamagrostis rubescens</i>)	4

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC (5.0)
NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)
ELEVATION: 1557 M
SLOPE: 9%
ASPECT: EAST
SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA:
TOTAL 400 KG/HA*
(*ESTIMATED)

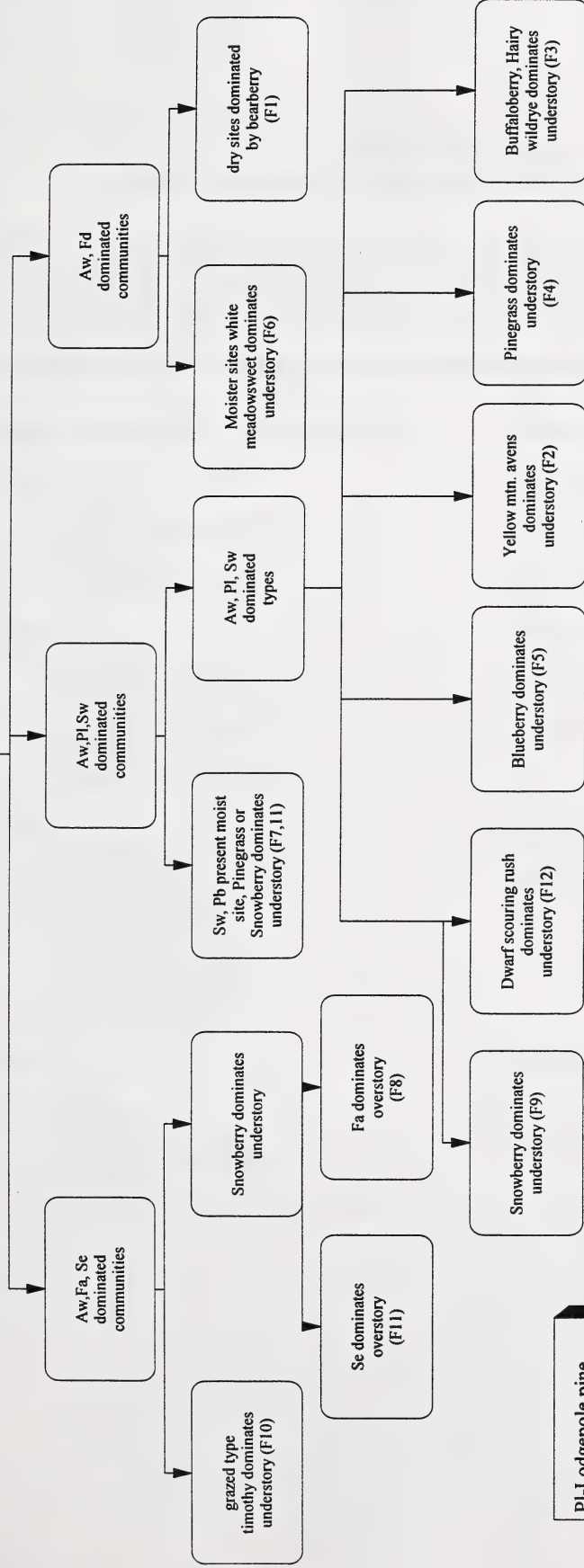
SUGGESTED STOCKING RATE
4.5 HA/AUM or 10 AC/AUM

MONTANE SUBREGION
MIXEDWOOD COMMUNITY TYPES



Photo 9: This represents an Aw-Sw mixedwood community type. There is a good forage base under the aspen, however as the spruce cover increases productivity will decline.

Mixedwood Communities



Pl-Lodgepole pine
 Fd-Douglas fir
 Sw-White spruce
 Se-Engelmann spruce
 Fa-Subalpine fir
 Pf-Limber pine
 Sb-Black spruce
 Aw-Aspen
 Pb-Balsam poplar

Key to Mixedwood community types in the Montane subregion

F1: Aw-Fd/Bearberry

(*Populus tremuloides*-*Pseudotsuga menziesii*/*Arctostaphylos uva-ursi*)

n=1 This community represents an aspen dominated community type that is undergoing succession to douglas fir. It is part of the bearberry ecosite described by Archibald et al. (1996). This ecosite occupies dry upper slope positions with south exposures and coarse textured soils. Forage production on this site will be low because of the dry site conditions and livestock will have a difficulty accessing the upper slope position. This community should be rated as secondary range

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN	
(<i>Populus tremuloides</i>)	34
DOUGLAS-FIR	
(<i>Pseudotsuga menziesii</i>)	23

SHRUBS

SASKATOON	
(<i>Amelanchier alnifolia</i>)	9
CREeping JUNIPER	
(<i>Juniperus horizontalis</i>)	12
BUFFALOBERRY	
(<i>Shepherdia canadensis</i>)	2

FORBS

BEARBERRY	
(<i>Arctostaphylos uva-ursi</i>)	43
COMMON YARROW	
(<i>Achillea millefolium</i>)	3
STRAWBERRY	
(<i>Fragaria virginiana</i>)	9
CUT-LEAVED ANEMONE	
(<i>Anemone multifida</i>)	3

GRASSES

SEDGE	
(<i>Carex spp.</i>)	10
SLENDER WHEAT GRASS	
(<i>Agropyron trachycaulum</i>)	3
PINEGRASS	
(<i>Calamagrostis rubescens</i>)	9

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC (3.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1661 M

SOIL DRAINAGE: RAPIDLY

SLOPE: 15%

ASPECT: SOUTH

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

TOTAL 600 KG/HA*

(*ESTIMATED)

SUGGESTED STOCKING RATE
3.0 HA/AUM OR 6.7 AC/AUM

F2: Sw-P1-Pb/Yellow Mtn. avens*(Picea glauca-Pinus contorta-Populus balsamifera/Dryas drummondii)*

n=1 This community is typical of dry, gravelly river flats with nutrient poor soils. It is similar to the Yellow Mtn. avens /Junegrass community type previously described, but this community type is successional more advanced. The poor soil conditions limits the forage productivity and amount of regrowth after grazing. This community type should be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)**TREES**

WHITE SPRUCE (<i>Picea glauca</i>)	39
LOGEPOLE PINE (<i>Pinus contorta</i>)	20
BALSAM POPLAR (<i>Populus balsamifera</i>)	17

SHRUBS

BUFFALOBERRY (<i>Shepherdia canadensis</i>)	4
PRICKLY ROSE (<i>Rosa acicularis</i>)	1

FORBS

YELLOW MTN. AVENS (<i>Dryas drummondii</i>)	12
SHOWY ASTER (<i>Aster conspicuus</i>)	7
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	3
SHOWY LOCOWEED (<i>Oxytropis splendens</i>)	2

GRASSES

CANADA BLUEGRASS (<i>Poa compressa</i>)	1
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC (4.0)

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1547 M

SLOPE: 1%

ASPECT: NORTH

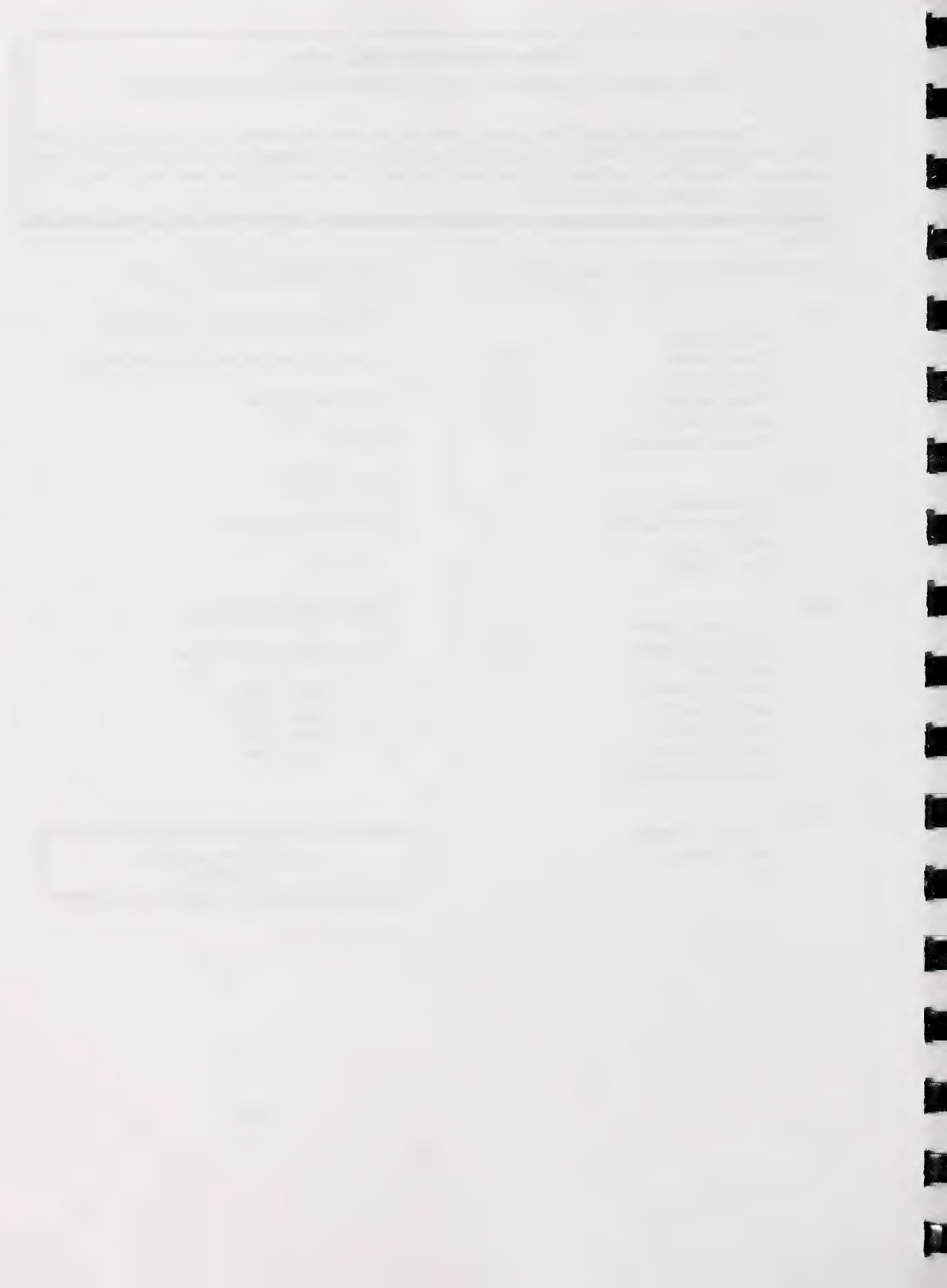
SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	152
FORB	252
SHRUB	40
TOTAL	444

SUGGESTED STOCKING RATE NON-USE



F3: Aw-Pl/Buffaloberry/Hairy wildrye
(Populus tremuloides-Pinus contorta/Shepherdia canadensis/Elymus innovatus)

n=1 This community occurs on submesic, well drained, south and west-facing slopes. It is very similar to the Pl/Buffaloberry/Pinegrass community type previously described, but is in an earlier successional stage. The forage productivity on this community is only moderate and should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN <i>(Populus tremuloides)</i>	43
LOGEPOLE PINE <i>(Pinus contorta)</i>	21

SHRUBS

SNOWBERRY <i>(Symphoricarpos occidentalis)</i>	11
SASKATOON <i>(Amelanchier alnifolia)</i>	T
CANADA BUFFALOBERRY <i>(Shepherdia canadensis)</i>	15

FORBS

STRAWBERRY <i>(Fragaria virginiana)</i>	9
CREEPING MAHONIA <i>(Berberis repens)</i>	6
YELLOW PEAVINE <i>(Lathyrus ochroleucus)</i>	2
DANDELION <i>(Taraxacum officinale)</i>	2

GRASSES

HAIRY WILD RYE <i>(Elymus innovatus)</i>	20
PINEGRASS <i>(Calamagrostis rubescens)</i>	14

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC
 NUTRIENT REGIME (MEAN): MESOTROPHIC
 ELEVATION RANGE (MEAN): 1608 M
 ASPECT: SOUTH
 SLOPE: 7%
 SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

TOTAL 350 KG/HA*

(*ESTIMATED)

STOCKING RATE 5.2 HA/AUM OR 12.8 AC/AUM SUGGESTED STOCKING RATE NON-USE
--

Mathematics

Mathematics is the study of numbers, shapes, and patterns. It is a fundamental part of science and technology.

Arithmetic

Arithmetic is the study of numbers and their properties. It includes addition, subtraction, multiplication, and division.

Algebra

Algebra is the study of symbols and the rules for manipulating them. It includes solving equations and inequalities.

Geometry

Geometry is the study of shapes and their properties. It includes the study of lines, angles, and surfaces.

Calculus

Calculus is the study of change and motion. It includes the study of limits, derivatives, and integrals.

Statistics

Statistics is the study of data and its analysis. It includes the study of probability and inference.

Trigonometry

Trigonometry is the study of the relationships between the sides and angles of triangles. It includes the study of sine, cosine, and tangent functions.

Number Theory

Number Theory is the study of the properties of numbers. It includes the study of prime numbers and divisibility.

Combinatorics

Combinatorics is the study of the ways in which objects can be arranged. It includes the study of permutations and combinations.

Probability

Probability is the study of the likelihood of events occurring. It includes the study of random variables and probability distributions.

Mathematical Logic

Mathematical Logic is the study of the foundations of mathematics. It includes the study of set theory and formal logic.

F4: Aw-Pl/Pinegrass

(*Populus tremuloides*-*Pinus contorta*/*Calamagrostis rubescens*)

n=1 This community type is dominated by an overstory of aspen and lodgepole pine, and represents the mid successional stage between an Aw/Pinegrass and Pl/Pinegrass dominated community type. Pinegrass is generally unpalatable to livestock, but if grazed early in the spring they will utilize it as a forage source. The forage productivity of this community type is midway between the aspen dominated community (1278 kg/ha) and the pine dominated community (598 kg/ha). This community would be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	40
ASPEN (<i>Populus tremuloides</i>)	40

SHRUBS

ROSE (<i>Rosa acicularis</i>)	2
------------------------------------	---

FORBS

TWINFLOWER (<i>Linnaea borealis</i>)	25
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	16
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	14
RICHARDSON'S GERANIUM (<i>Geranium richardsonii</i>)	12
CREAM-COLORED VETCHLING (<i>Lathyrus ochroleucus</i>)	6

GRASSES

PINE GRASS (<i>Calamagrostis rubescens</i>)	38
FRINGED BROME (<i>Bromus ciliatus</i>)	13
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION RANGE (MEAN): 1554 M

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	600
FORB	384
TOTAL	984

SUGGESTED STOCKING RATE
1.8 HA/AUM

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F5: Aw-Sw/Blueberry
(*Populus tremuloides*-*Picea glauca*/*Vaccinium* spp.)

n=2 This community represents the mid successional stage of a Sw/Moss dominated community type. The spruce dominated community types usually occupy lower slope positions with northerly aspects. These sites have escaped the recent fire history in the Montane and have succeeded to white spruce the climax species. There is very little growth of forbs and grass in this community type and should be rated as non-use for domestic livestock.

PLANT COMPOSITION CANOPY COVER (%)

ENVIRONMENTAL VARIABLES

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	36
ASPEN (<i>Populus tremuloides</i>)	33

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION RANGE (MEAN): 1524 M

SHRUBS

TALL BILBERRY (<i>Vaccinium membranaceum</i>)	6
GROUSEBERRY (<i>Vaccinium scoparium</i>)	7
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	4

ASPECT: NORTHERLY
SLOPE: 2%
SOIL DRAINAGE: WELL

FORBS

WESTERN MEADOW RUE (<i>Thalictrum occidentale</i>)	4
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	8
AMERICAN VETCH (<i>Vicia americana</i>)	1
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	1
CREAM-COLORED VETCHLING (<i>Lathyrus ochroleucus</i>)	2

CARRYING CAPACITY

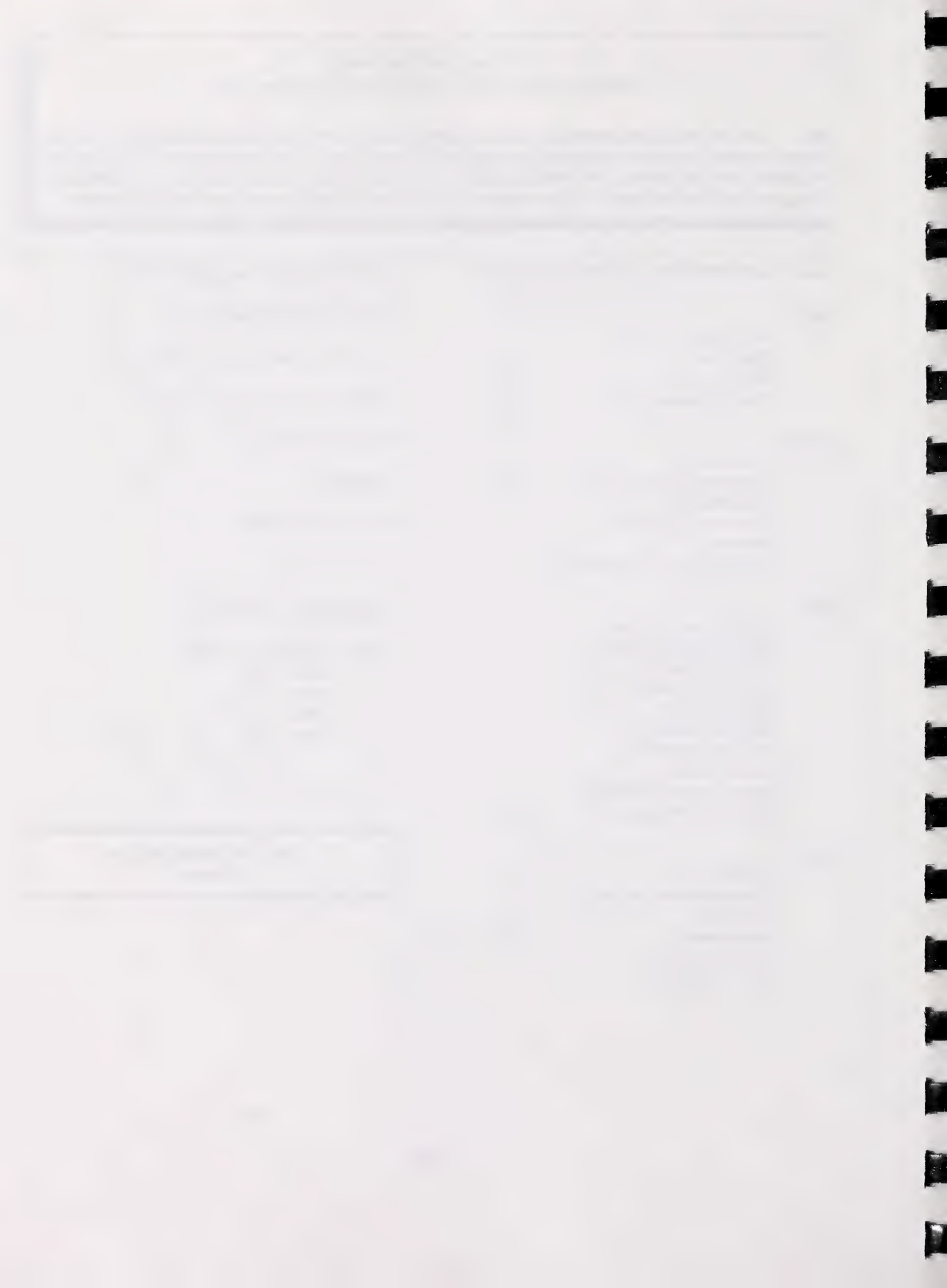
FORAGE PRODUCTION IN KG/HA

GRASS	330
FORB	46
SHRUB	48
TOTAL	424

GRASSES

PINE GRASS (<i>Calamagrostis rubescens</i>)	3
MELIC GRASS (<i>Melica smithii</i>)	12
VIRGINIA WILD RYE (<i>Elymus virginicus</i>)	4

SUGGESTED STOCKING RATE NON-USE



F6: Aw-Fd/White meadowsweet

(*Populus tremuloides*-*Pseudotsuga menziesii*/*Spiraea betulifolia*)

n=1 This community type represents an intermediate stage of succession between the Sw-Fd/White meadowsweet and Aw/White meadowsweet/Pinegrass dominated community types. White meadowsweet is indicative of sites with mesic moisture and medium nutrient regimes (Archibald et al. 1996). When this community succeeds to a conifer dominated type there will be insufficient forage for domestic livestock. Presently, with the high aspen cover there will be a moderate forage base and this community type should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

DOUGLAS FIR (<i>Pseudotsuga menziesii</i>)	40
ASPEN (<i>Populus tremuloides</i>)	36

SHRUBS

WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	19
DWARF BILBERRY (<i>Vaccinium caespitosum</i>)	2
PRICKLY ROSE (<i>Rosa acicularis</i>)	1

FORBS

SHOWY ASTER (<i>Aster conspicuus</i>)	5
GRACEFUL CINQUEFOIL (<i>Potentilla gracilis</i>)	2
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	1
STRAWBERRY (<i>Fragaria virginiana</i>)	6

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	4
HAIRY WILD RYE (<i>Elymus innovatus</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1593 M

ASPECT: SOUTH

SLOPE: 20%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
TOTAL 800 KG/HA*

(*ESTIMATED)

SUGGESTED STOCKING RATE 2.3 HA/AUM OR 5.6 AC/AUM



F7: Aw-Pb-Sw/Pinegrass

(*Populus tremuloides*-*Populus balsamifera*-*Picea glauca*/*Calamagrostis rubescens*)

n=1 This community type occurs on moist, lower slope positions where seepage occurs in the spring or after heavy rainfall. Succession will be to a spruce dominated forest. The high tree cover limits the light reaching the forest floor. Consequently, only a moderate amount of forage is produced for domestic livestock.

PLANT COMPOSITION CANOPY COVER (%)

ENVIRONMENTAL VARIABLES

TREES

ASPEN	
(<i>Populus tremuloides</i>)	25
BALSAM POPLAR	
(<i>Populus balsamifera</i>)	15
WHITE SPRUCE	
(<i>Picea glauca</i>)	15

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1372 M

ASPECT: WEST

SHRUBS

ROSE	
(<i>Rosa acicularis</i>)	2
WHITE MEADOWSWEET	
(<i>Spiraea betulifolia</i>)	4

SLOPE: 8%

SOIL DRAINAGE: WELL

FORBS

WILD WHITE GERANIUM	
(<i>Geranium richardsoni</i>)	11
VEINY MEADOW RUE	
(<i>Thalictrum venulosum</i>)	5
STRAWBERRY	
(<i>Fragaria virginiana</i>)	7
TALL LUNGWORT	
(<i>Mertensia paniculata</i>)	5
CREAM-COLORED VETCHLING	
(<i>Lathyrus ochroleucus</i>)	1

CARRYING CAPACITY

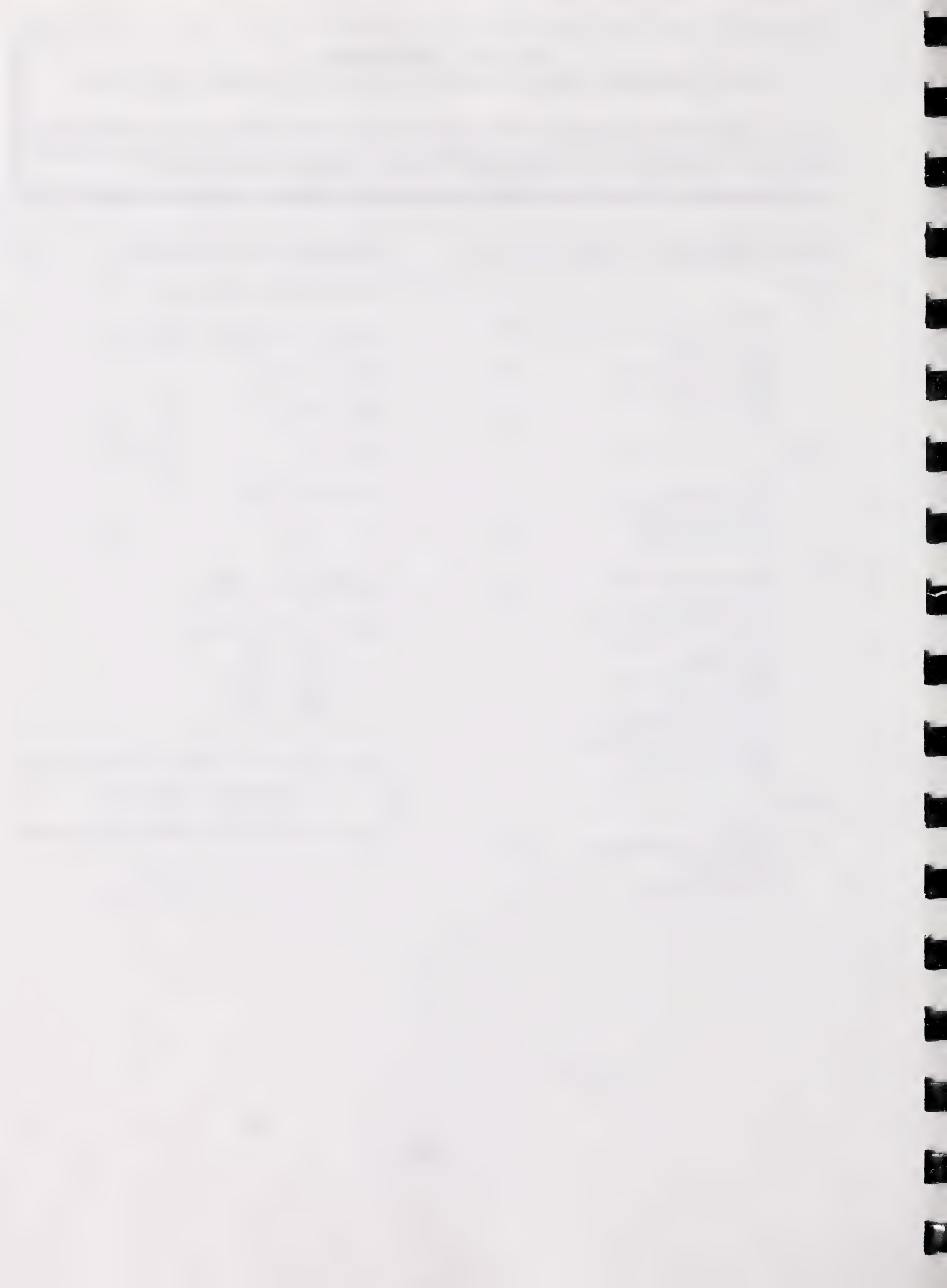
FORAGE PRODUCTION IN KG/HA

GRASS	122
FORB	282
SHRUB	28
TOTAL	412

GRASSES

PINEGRASS	
(<i>Calamagrostis rubescens</i>)	8
HAIRY WILDRYE	
(<i>Elymus innovatus</i>)	8

SUGGESTED STOCKING RATE
4.4 HA/AUM OR 9.9 AC/AUM



F8: Aw-Fa/Snowberry/Pinegrass

(*Populus tremuloides*-*Abies lasiocarpa*/*Symphoricarpos albus*/*Calamagrostis rubescens*)

n=1 This community is very similar to the Fa-Pl-Sw/White meadowsweet/Pinegrass previously described. This community was described in the Castle area and is indicative of the overlap between the Subalpine and Montane subregions. The overstory has a high cover of subalpine fir a species characteristic of the subalpine environment, but the understory is dominated by snowberry and pinegrass species characteristic of the montane environment. The forage productivity of this community type is moderate, but the majority of production is coming from snowberry which is generally unpalatable to livestock. This community should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	6
ASPEN (<i>Populus tremuloides</i>)	48
SUBALPINE FIR (<i>Abies lasiocarpa</i>)	10

SHRUBS

SNOWBERRY (<i>Symphoricarpos albus</i>)	59
SASKATOON (<i>Amelanchier alnifolia</i>)	5
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	1

FORBS

CREEPING MAHONIA (<i>Berberis repens</i>)	25
WESTERN MEADOW RUE (<i>Thalictrum occidentale</i>)	6
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	6
LINDLEY'S ASTER (<i>Aster laevis</i>)	5

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	16
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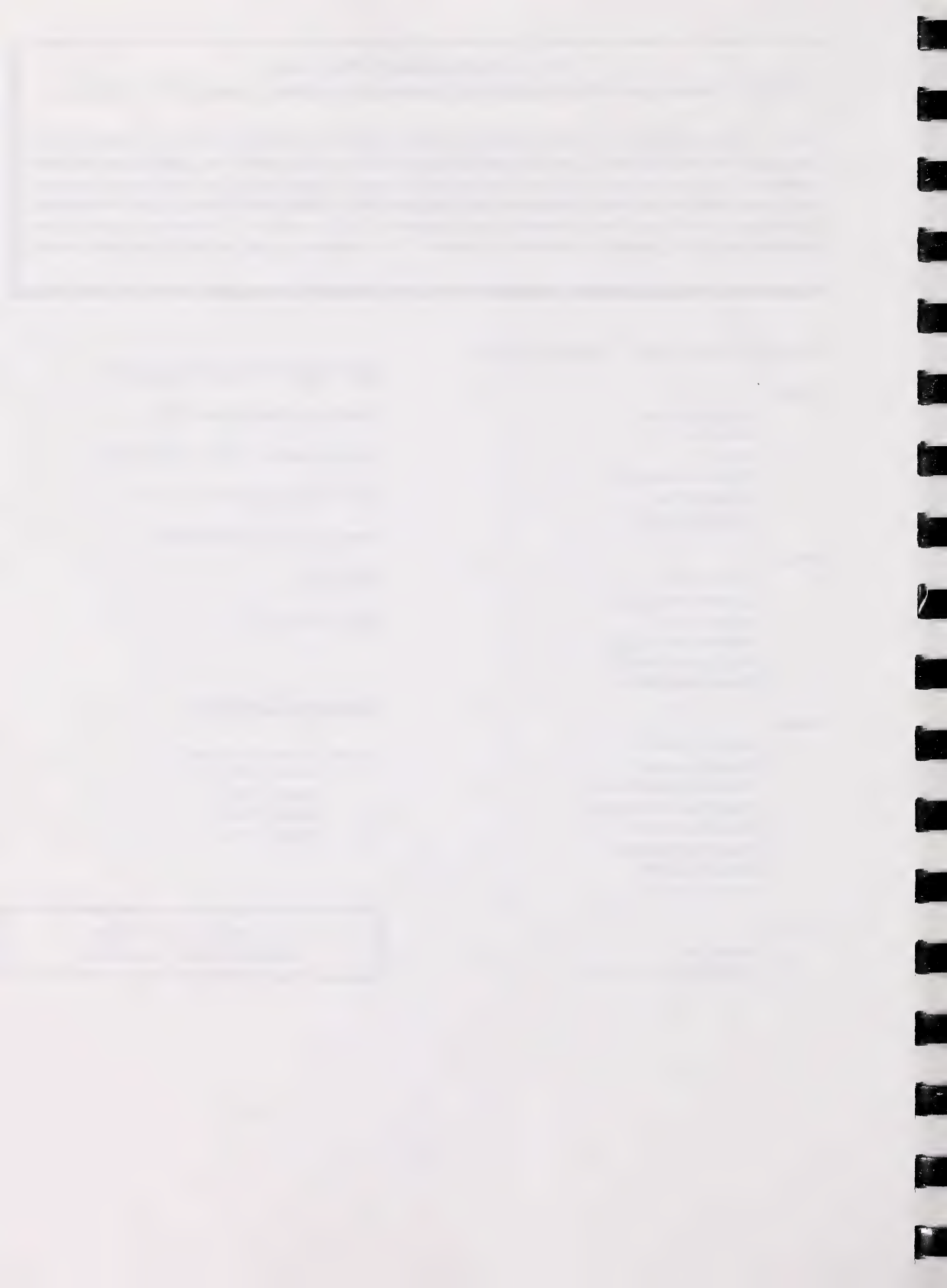
ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION RANGE (MEAN): 1460 M
ASPECT: SOUTH TO SOUTHWEST
SLOPE: 9%
SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
GRASS 152
FORB 210
SHRUB 754
TOTAL 1116

SUGGESTED STOCKING RATE
1.6 HA/AUM OR 3.6 AC/AUM



F9: Pl-Aw/Snowberry/Kentucky bluegrass

(*Pinus contorta*-*Populus tremuloides*/*Symphoricarpos occidentalis*/*Poa pratensis*)

n=1 This community type represents an earlier successional stage of the Pl/White meadowsweet and Pl/Pinegrass community types. These communities occupy mesic sites with medium nutrient regimes (Archibald et al. 1996). It appears that this community type was grazed heavily in the past and then rested. Willoughby (1995) found that aspen stands that have been heavily grazed for prolonged periods have a low cover of native shrubs, forbs and grass species and a high cover of Kentucky bluegrass, clover and dandelion. This community has a high cover of Kentucky bluegrass, but it also has a high cover of native shrubs, forbs and grass, which may indicate that it has been grazed heavily to the point of Kentucky bluegrass invasion and then rested allowing recovery of the native species. This community is very productive for domestic livestock, but Kentucky bluegrass provides a poor source of forage for wintering wildlife.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE
(*Pinus contorta*) 30

ASPEN
(*Populus tremuloides*) 15

SHRUBS

SNOWBERRY
(*Symphoricarpos occidentalis*) 34

WHITE MEADOWSWEET
(*Spiraea betulifolia*) 14

THIMBLEBERRY
(*Rubus parviflora*) 14

GROUND JUNIPER
(*Juniperus communis*) 5

FORBS

STRAWBERRY
(*Fragaria virginiana*) 12

STICKY PURPLE GERANIUM
(*Geranium viscosissimum*) 8

SMOOTH ASTER
(*Aster laevis*) 6

DANDELION
(*Taraxacum officinale*) 5

AMERICAN VETCH
(*Vicia americana*) 4

GRASSES

KENTUCKY BLUEGRASS
(*Poa pratensis*) 21

PINEGRASS
(*Calamagrostis rubescens*) 14

TIMOTHY
(*Phleum pratense*) 5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC (5.0)

NUTRIENT REGIME (MEAN): MESOTROPIC

SOIL DRAINAGE: WELL

ASPECT: WEST

SLOPE: 26%

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 668

FORB 774

SHRUB 506

TOTAL 1948

STOCKING RATE

0.9 HA/AUM OR 2.1 AC/AUM

UNIT 1: THE HISTORY OF THE UNITED STATES

1.1 The Founding of the United States

- 1.1.1 The American Revolution
- 1.1.2 The Declaration of Independence
- 1.1.3 The Constitution
- 1.1.4 The Bill of Rights
- 1.1.5 The Federalist Papers
- 1.1.6 The Anti-Federalists
- 1.1.7 The Ratification of the Constitution
- 1.1.8 The First Congress
- 1.1.9 The signing of the Constitution
- 1.1.10 The early years of the new nation

1.2 The Early Republic

1.2.1 The Presidency of George Washington

1.2.2 The Presidency of John Adams

1.2.3 The Presidency of Thomas Jefferson

1.2.4 The Presidency of James Madison

1.2.5 The Presidency of James Monroe

1.2.6 The Presidency of John Quincy Adams

1.2.7 The Presidency of Andrew Jackson

1.2.8 The Presidency of Martin Van Buren

1.2.9 The Presidency of William Henry Harrison

1.2.10 The Presidency of John Tyler

1.2.11 The Presidency of James K. Polk

1.2.12 The Presidency of Zachary Taylor

1.2.13 The Presidency of Millard Fillmore

1.2.14 The Presidency of Fremont

1.2.15 The Presidency of Benjamin Harrison

1.2.16 The Presidency of Grover Cleveland

1.2.17 The Presidency of William McKinley

1.2.18 The Presidency of Theodore Roosevelt

1.2.19 The Presidency of William Howard Taft

1.2.20 The Presidency of Woodrow Wilson

F10: Aw-Fa-Se/Timothy

(*Populus tremuloides*-*Abies lasiocarpa*-*Picea engelmannii*/*Phleum pratense*)

n=2 This community was described in the Castle area of the province and if left undisturbed would have likely succeeded to a Fa-Se/Heart lv'd arnica-dominated community type. Heavy grazing pressure has shifted the understory away from native species and allowed dandelion, clover, Canada thistle, timothy and Kentucky bluegrass to establish on the site. This change in species composition with increased grazing pressure is similar to work done by Willoughby (1995). The invasion of non-native species onto this site makes this community very productive for domestic livestock, but the presence of overgrazed communities indicates some type of distribution problem and the management of the disposition should be discussed with the permittees.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	5
SUBALPINE FIR (<i>Abies lasiocarpa</i>)	5
ASPEN (<i>Populus tremuloides</i>)	84

SHRUBS

SNOWBERRY (<i>Symphoricarpos occidentalis</i> <i>S. albus</i>)	12
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FORBS

WILD STRAWBERRY (<i>Fragaria virginiana</i>)	13
DANDELION (<i>Taraxacum officinale</i>)	33
WILD WHITE GERANIUM (<i>Geranium richardsonii</i>)	24
SMOOTH ASTER (<i>Aster laevis</i>)	11
CANADA THISTLE (<i>Cirsium arvense</i>)	5
CLOVER (<i>Trifolium repens</i>)	20

GRASSES

TIMOTHY (<i>Phleum pratense</i>)	25
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	11
MOUNTAIN BROME (<i>Bromus carinatus</i>)	7
SLENDER WHEAT GRASS (<i>Agropyron trachycaulum</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1402(1370-1434) M

SOIL DRAINAGE: RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	1328(968-1688)
FORB	696(266-1126)
SHRUB	232(218-246)
TOTAL	2256(1452-3060)

STOCKING RATE
0.8 HA/AUM OR 1.8 AC/AUM



F11: Spruce-Pb/Snowberry

(*Picea glauca*, *P. engelmannii*-*Populus balsamifera*/*Symphoricarpos occidentalis*)

n=3 Archibald et al. (1996) described a similar Pb/Snowberry-dominated community on moist lower slope positions where seepage occurs in the spring and after heavy rainfalls. They felt succession would be to white spruce. This community is successional more advanced than the Pb/Snowberry dominated community type. Likely the northerly aspects of the 3 stands described allowed this community to escape the extensive fire history in the area. The high canopy cover of trees and shrubs limits the amount of light reaching the forest floor and therefore there is only moderate amounts of forage available for domestic livestock. This community type would be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

SUBALPINE FIR (<i>Abies lasiocarpa</i>)	4
ENGELMANN SPRUCE (<i>Picea engelmannii</i>)	15
BALSAM POPLAR (<i>Populus balsamifera</i>)	16
WHITE SPRUCE (<i>Picea glauca</i>)	5

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	1
SNOWBERRY (<i>Symphoricarpos occidentalis</i> <i>S. albus</i>)	9
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	1

FORBS

FIELD HORSETAIL (<i>Equisetum arvense</i>)	8
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	6
STRAWBERRY (<i>Fragaria virginiana</i>)	4
CANADA VIOLET (<i>Viola canadensis</i>)	3
DANDELION (<i>Taraxacum officinale</i>)	2
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	2

GRASSES

MARSH REEDGRASS (<i>Calamagrostis canadensis</i>)	7
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ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO HYGRIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1507(1455-1554) M

ASPECT: NORTHERLY

SLOPE: 2(0-7)%

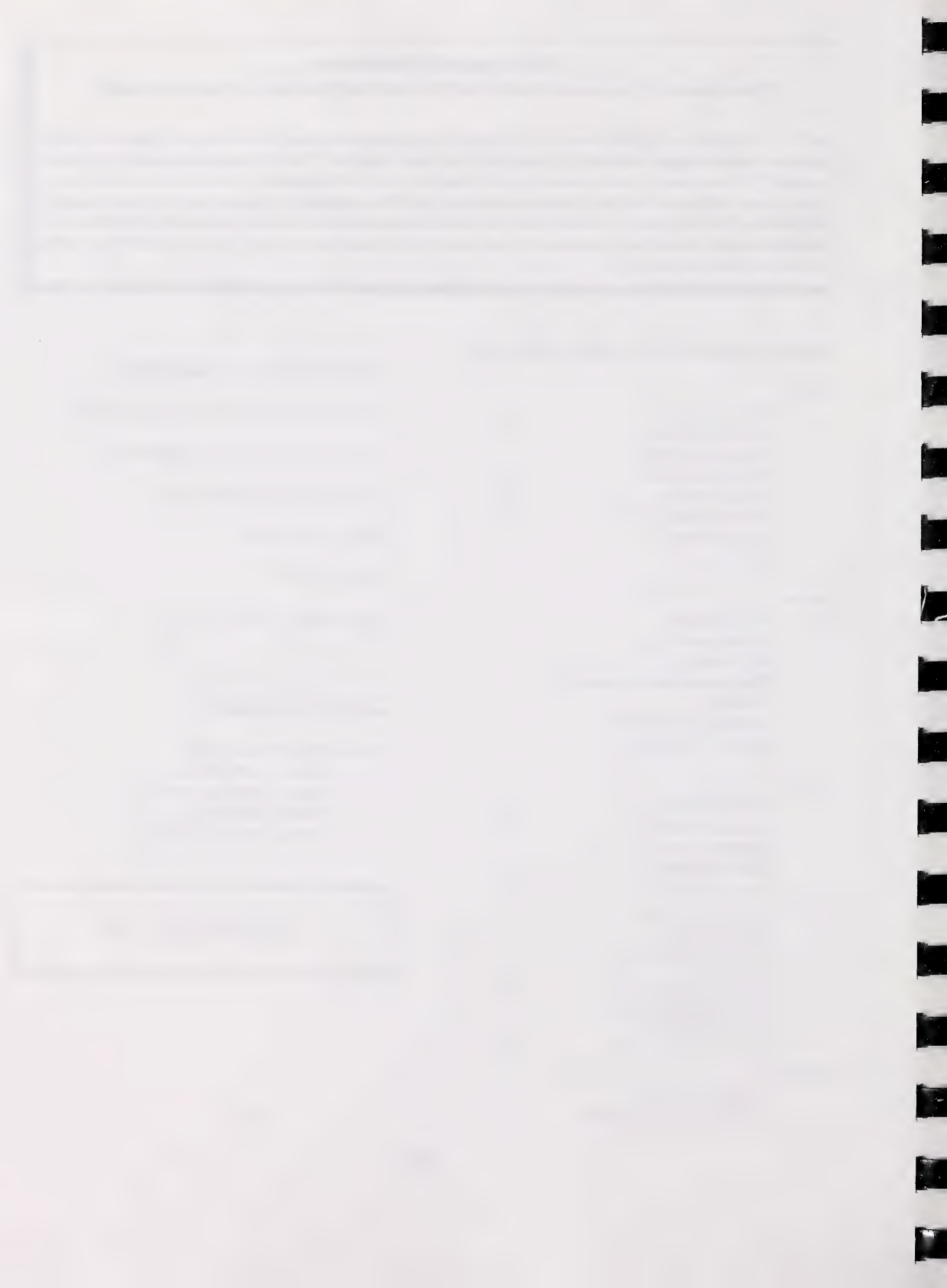
SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	188(20-252)
FORB	681(232-1018)
SHRUB	237(40-540)
TOTAL	1016(524-1578)

STOCKING RATE 1.8 HA/AUM OR 4.0 AC/AUM



F12: Sw-Aw/Scouring rush
(Picea glauca-Populus tremuloides/Equisetum scirpoides)

n=1 This community occupies moist, nutrient rich, lower slope positions. This community is very similar to the Sw/Horsetail community described by Archibald et al. (1996). Archibald et al. felt that the ecosite representing this community represented the wettest and most nutrient rich conditions for the Montane subregion. They felt balsam poplar was the pioneer species on this ecosite and that succession would be to white spruce. The high tree cover limits the light reaching the forest floor. Consequently, there is little forage available for domestic livestock. This community should be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN <i>(Populus tremuloides)</i>	15
WHITE SPRUCE <i>(Picea glauca)</i>	60
BALSAM POPLAR <i>(Populus balsamifera)</i>	10

SHRUBS

ROSE <i>(Rosa acicularis)</i>	3
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FORBS

DANDELION <i>(Taraxacum officinale)</i>	4
DWARF SCOURING RUSH <i>(Equisetum scirpoides)</i>	20
LINDLEY'S ASTER <i>(Aster ciliolatus)</i>	4
AMERICAN VETCH <i>(Vicia americana)</i>	1

GRASSES

KENTUCKY BLUEGRASS <i>(Poa pratensis)</i>	7
HAIRY WILD RYE <i>(Elymus innovatus)</i>	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1494 M

SLOPE: 1%

ASPECT: SOUTHEAST

SOIL DRAINAGE: MODERATELY WELL

CARRYING CAPACITY

FOREAGE PRODUCTION IN KG/HA
TOTAL 800 KG/HA*

(*ESTIMATED)

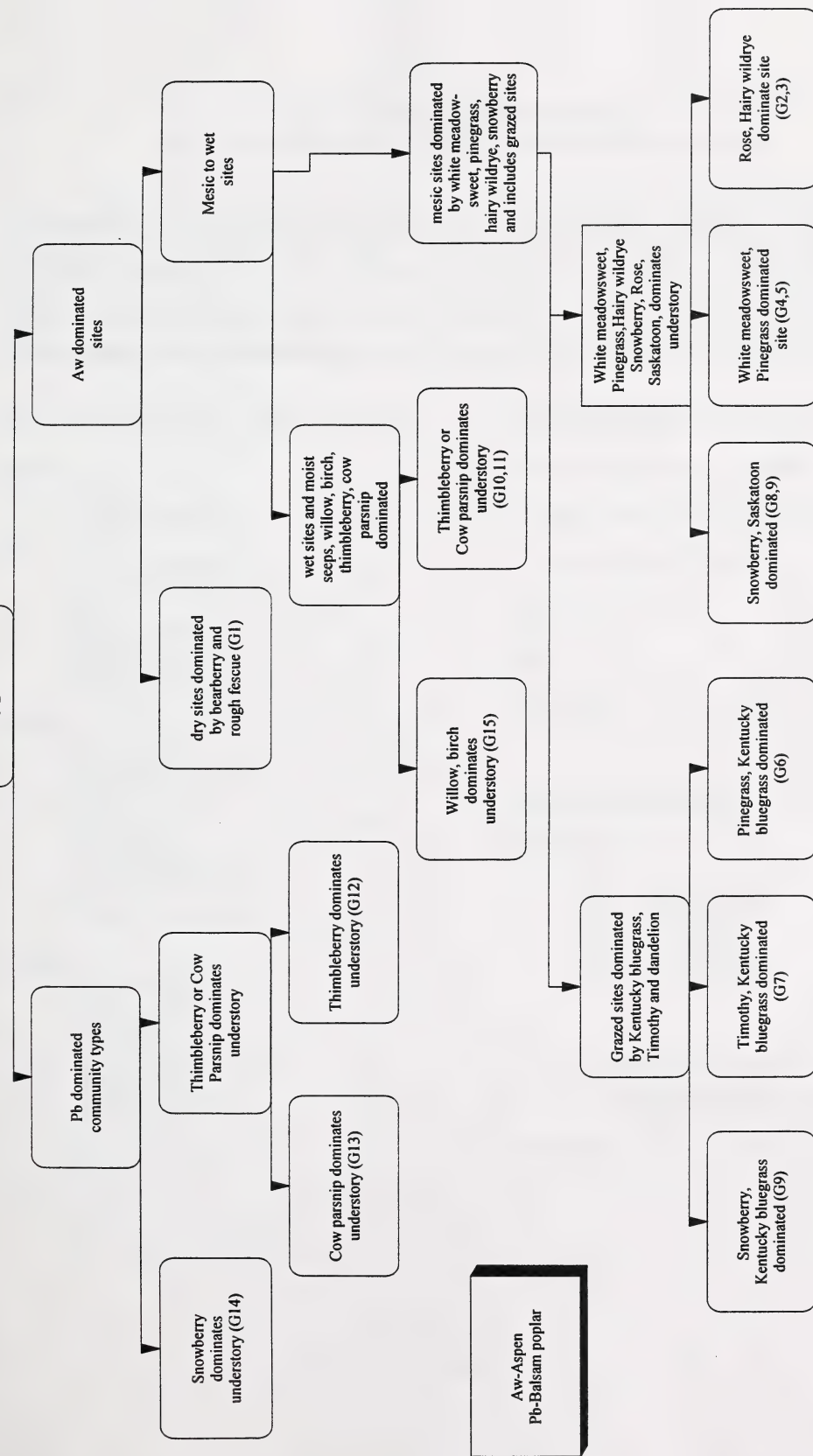
STOCKING RATE
2.3 HA/AUM OR 5.1 AC/AUM
SUGGESTED STOCKING RATE
NON-USE

MONTANE SUBREGION

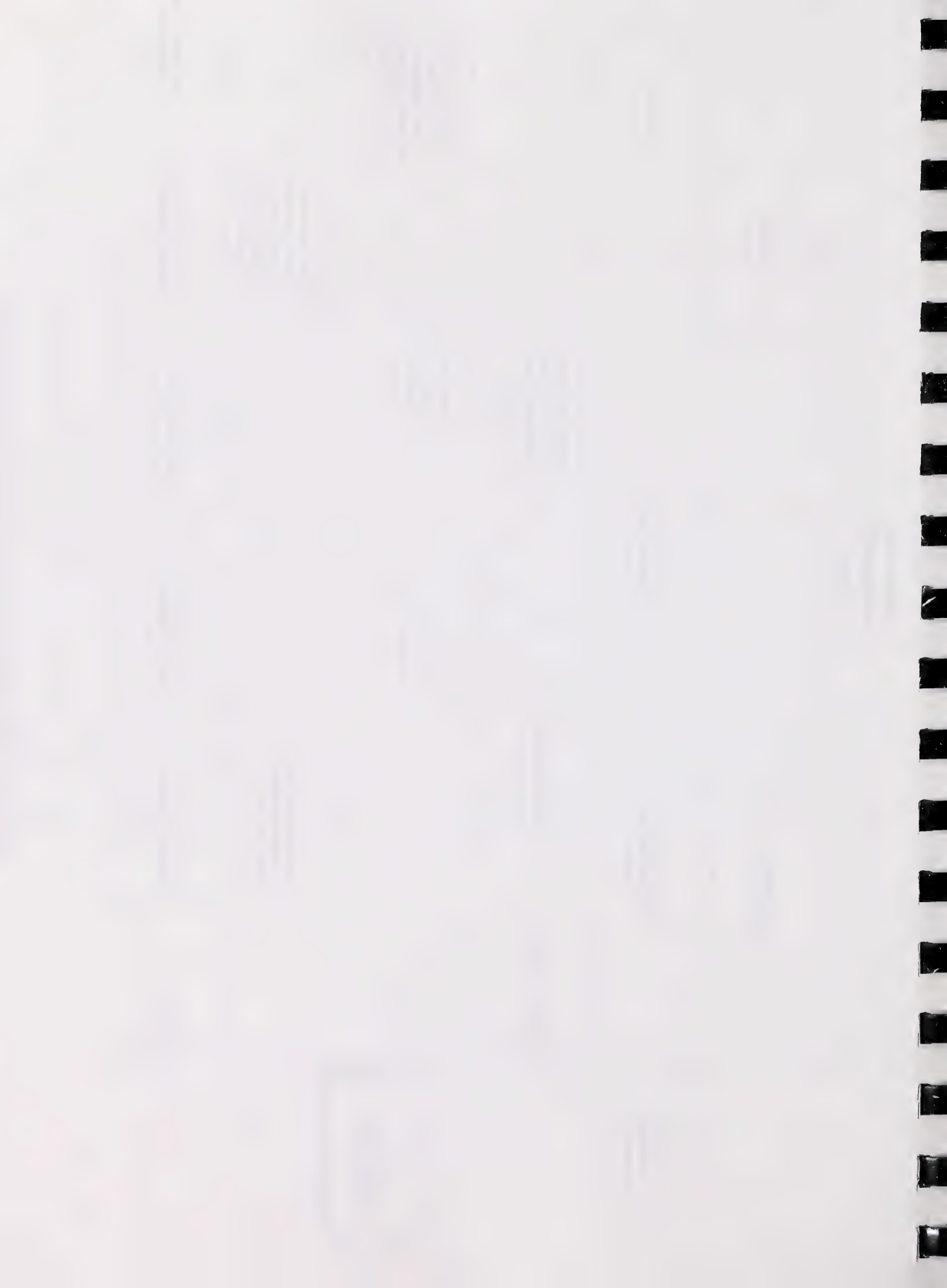
DECIDUOUS COMMUNITY TYPES



Photo 10: This Aw/Cow parsnip community type is typical of moist, nutrient-rich seepage areas north of the Crowsnest Pass. South of the pass cow parsnip is often replaced by thimbleberry.



Key to Deciduous community types in the Montane subregion



(*Populus tremuloides*/*Arctostaphylos uva-ursi*/*Festuca scabrella*)

PLANT COMPOSITION CANOPY COVER (%)

TREES

(*Populus tremuloides*)

38

SHRUBS

(*Potentilla fruticosa*)

1

(*Rosa acicularis*)

3

(*Symphoricarpos albus*)

2

FORBS

(*Arctostaphylos uva-ursi*)

15

(Aster ciliolatus)

12

(*Fragaria virginiana*)

5

(*Geranium richardsonii*)

5

GRASSES

(*Festuca scabrella*)

8

(*Calamagrostis rubescens*)

6

(*Festuca idahoensis*)

6

MOISTURE REGIME (MEAN): SUBMESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1440(1420-1460) M

SOIL DRAINAGE: WELL

SLOPE: 5(0-10)%

ASPECT: SOUTH

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 694(318-1070)

FORB 61(18-104)

SHRUB 51(14-88)

TOTAL 856(436-1276)

SUGGESTED STOCKING RATE
2.1 HA/AUM OR 4.8 AC/AUM

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G2: Aw/Rose/Hairy wildrye
(*Populus tremuloides*/*Rosa acicularis*/*Elymus innovatus*)

n=5 This community type occurs on submesic, well drained, south and west-facing slopes. It is situated in slightly lower slope positions and therefore has better developed soils than the limber pine and bearberry-dominated community types previously described. Archibald et al. (1996) described this community type as being part of the Canada buffaloberry-hairy wildrye ecosite. They felt this ecosite to be relatively dry for the subregion, but not as dry as the limber pine and bearberry ecosites. Succession on this site will likely be to the Pl/Bufaloberry/Pinegrass or Fd/Hairy wildrye-dominated community types previously described. This community type has a moderate amount of forage for domestic livestock. It should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

ENVIRONMENTAL VARIABLES

TREES

ASPEN (<i>Populus tremuloides</i>)	62
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MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

SHRUBS

ROSE (<i>Rosa acicularis</i>)	14
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	1
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	2

ELEVATION :1589 (1350-2270) M

SLOPE: 4(0-10)%

ASPECT: SOUTHERLY

SOIL DRAINAGE: WELL TO RAPIDLY

FORBS

LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	5
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	12
DANDELION (<i>Taraxacum officinale</i>)	4
YELLOW PEAVINE (<i>Lathyrus ochroleucus</i>)	4
FIREWEED (<i>Epilobium angustifolium</i>)	2

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	856(374-1906)
FORB	313(222-408)
SHRUB	75(0-252)
TOTAL	1244(652-2330)

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	25
ROUGH FESCUE (<i>Festuca scabrella</i>)	2
PINEGRASS (<i>Calamagrostis rubescens</i>)	4

STOCKING RATE 1.5 HA/AUM OR 3.3 AC/AUM

G3: Aw/Hairy wildrye
(*Populus tremuloides*/*Elymus innovatus*)

n=1 This community type occurs on submesic, well drained, south and west-facing slopes within the Ya Ha Tinda area. It occurs in areas of the grasslands where moisture is sufficient to grow trees. Beckingham et al. (1996) described this community type as being part of the hairy wildrye ecosite. They felt this ecosite to be relatively dry for the subregion, but not as dry as the bearberry and grassland ecosites. Succession on this site will likely be to the Pl/Hairy wildrye or Sw/Hairy wildrye-dominated community types previously described. This community type has a high amount of forage because of the increased moisture. In the winter elk often occupy these sites as bedding areas during the day. The southerly and westerly aspect increases solar gains and the trees provide a degree of security.

PLANT COMPOSITION CANOPY COVER (%)

TREES		
ASPEN		
(<i>Populus tremuloides</i>)	35	
SHRUBS		
SHRUBBY CINQUEFOIL		
(<i>Potentilla fruticosa</i>)	1	
FORBS		
AMERICAN VETCH		
(<i>Vicia americana</i>)	6	
WILD STRAWBERRY		
(<i>Fragaria virginiana</i>)	18	
YARROW		
(<i>Achillea millefolium</i>)	5	
YELLOW PEAVINE		
(<i>Lathyrus ochroleucus</i>)	2	
NORTHERN BEDSTRAW		
(<i>Galium boreale</i>)	3	
GRASSES		
HAIRY WILD RYE		
(<i>Elymus innovatus</i>)	22	
ROUGH FESCUE		
(<i>Festuca scabrella</i>)	4	
TIMOTHY		
(<i>Phleum pratense</i>)	4	
FRINGED BROME		
(<i>Bromus ciliatus</i>)	4	

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN):
SUBMESIC
NUTRIENT REGIME (MEAN):
MESOTROPHIC (3.0)
ELEVATION:
1700 M
SLOPE:
10%
ASPECT:
SOUTHERLY
SOIL DRAINAGE:
WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	836
FORB	1228
TOTAL	2064

STOCKING RATE(HORSES)
1.3 HA/AUM
RECOMMENDED STOCKING RATE
NON-USE



G4: Aw/White meadowsweet/Pinegrass
(Populus tremuloides/Spiraea betulifolia/Calamagrostis rubescens)

n=10 This community is one of several community types which represent the mesic/medium ecosite for the Montane subregion. These sites can be dominated by Douglas fir, white spruce, aspen or lodgepole pine. The understory can be dominated by white meadowsweet, pinegrass or feather moss depending upon the successional status of the stand. In the vicinity of the Crowsnest Pass creeping mahonia is also common on these sites (Archibald et al. 1996). White meadowsweet is well adapted to growing on dry rocky slopes (MacKinnon et al. 1992). The presence of a high cover of white meadowsweet may indicate slightly drier conditions and shallower soils than a community dominated by pinegrass. Because this community type is in an early successional stage it produces a moderate amount of forage for domestic livestock and should be considered secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN <i>(Populus tremuloides)</i>	49
LODGEPOLE PINE <i>(Pinus contorta)</i>	3

SHRUBS

WHITE MEADOWSWEET <i>(Spiraea betulifolia)</i>	18
ROSE <i>(Rosa acicularis.)</i>	3
DWARF BILBERRY <i>(Vaccinium caespitosum)</i>	3
SHRUBBY CINQUEFOIL <i>(Potentilla fruticosa)</i>	1
CANADA BUFFALOBERRY <i>(Shepherdia canadensis)</i>	T

FORBS

SHOWY ASTER <i>(Aster conspicuus)</i>	7
STRAWBERRY <i>(Fragaria virginiana)</i>	6
NORTHERN BEDSTRAW <i>(Galium boreale)</i>	2
YELLOW PEAVINE <i>(Lathyrus ochroleucus)</i>	5

GRASSES

HAIRY WILD RYE <i>(Elymus innovatus)</i>	4
SEDGE <i>(Carex spp.)</i>	1

PINEGRASS

(Calamagrostis rubescens)

20

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO SUBHYGRIC

NUTRIENT REGIME (MEAN): MESOTROPHIC TO PERMESOTROPHIC

ELEVATION RANGE (MEAN): 1543(1460-1676) M

ASPECT: SOUTH TO WEST

SLOPE: 9(0-25)%

SOIL DRAINAGE: WELL TO MOD. WELL

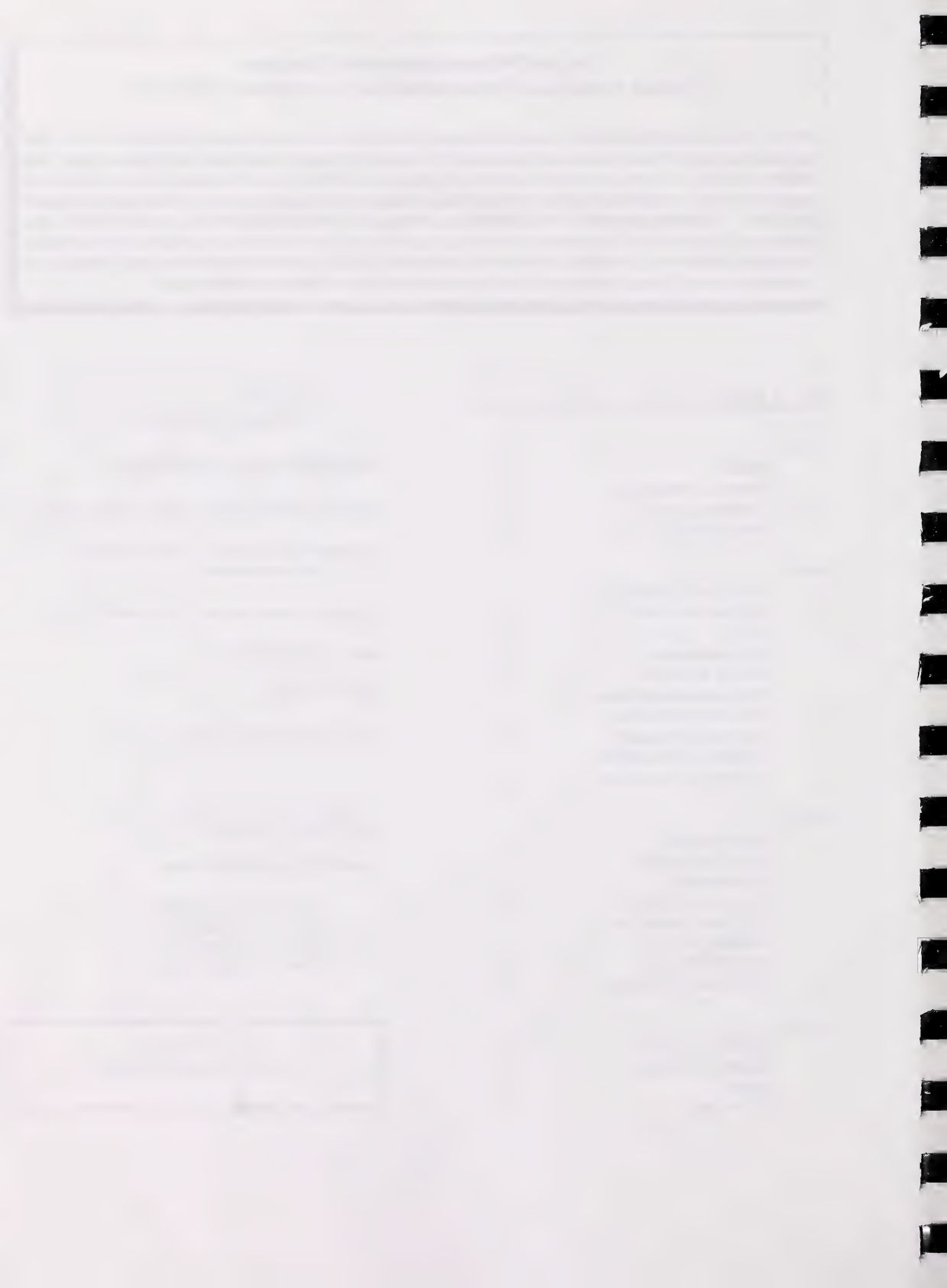
CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	425(332-518)
FORB	531(444-618)
SHRUB	190(164-216)
TOTAL	1146(992-1300)

STOCKING RATE

1.6 HA/AUM OR 3.6 AC/AUM



G5: Aw/Rose/Pinegrass

(*Populus tremuloides*/*Rosa acicularis*/*Calamagrostis rubescens*)

n=28 This community, dominated by an aspen overstory and an understory of pinegrass, represents an earlier successional stage of the PI/Pinegrass community type. This community is also very similar to the previously described Aw/White meadowsweet/Pinegrass community type, but the high cover of pinegrass and low cover of white meadowsweet may indicate slightly moister, better developed soils. Pinegrass is generally unpalatable to livestock, but if it is grazed early in the spring they will utilize it as a forage source. The forage productivity of this community type is moderate. As a result, this community should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR (<i>Populus balsamifera</i>)	3
ASPEN (<i>Populus tremuloides</i>)	45

SHRUBS

ROSE (<i>Rosa acicularis</i>)	9
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	1
SASKATOON (<i>Amelanchier alnifolia</i>)	1

FORBS

YELLOW PEA VINE (<i>Lathyrus ochroleucus</i>)	4
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	2
STRAWBERRY (<i>Fragaria virginiana</i>)	9
AMERICAN VETCH (<i>Vicia americana</i>)	3
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	7
SHOWY ASTER (<i>Aster conspicuus</i>)	5

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	17
HAIRY WILDRYE (<i>Elymus innovatus</i>)	6

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC TO PERMESOTROPHIC

ELEVATION RANGE (MEAN): 1524(1360-1646)

ASPECT: VARIABLE

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	612 (0-1086)
FORB	456(0-1584)
GRASS	26(0-128)
TOTAL	1097(480-2204)

SUGGESTED STOCKING RATE
1.7 HA/AUM OR 3.7 AC/AUM

Date: _____	
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Teacher: _____	
Student: _____	
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Room: _____	
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Date: _____	
Page: _____	
Subject: _____	
Teacher: _____	
Student: _____	
Class: _____	
Section: _____	
Room: _____	
Time: _____	
Grade: _____	
Score: _____	
Comments: _____	

(*Populus tremuloides*/*Calamagrostis rubescens*-*Poa pratensis*)

n=2 This community type is very similar to the previously described Aw/Rose/Pinegrass community, but has been grazed by livestock. It appears that this community type was grazed heavily in the past and then rested. Willoughby (1995) found that aspen stands that have been heavily grazed for prolonged periods have a low cover of native shrubs, forbs and grass species and a high cover of Kentucky bluegrass, clover and dandelion. This community has a high cover of Kentucky bluegrass, but it also has a high cover of native shrubs, forbs and grass, which may indicate that it has been grazed heavily to the point of Kentucky bluegrass invasion and then rested allowing recovery of the native species. This community is very productive for domestic livestock, but Kentucky bluegrass provides a poor source of forage for wintering wildlife.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN
(*Populus tremuloides*) 21

SHRUBS

WILD RED RASPBERRY	
(<i>Rubus idaeus</i>)	8
ROSE	
(<i>Rosa acicularis</i>)	8

FORBS

STRAWBERRY	
(<i>Fragaria virginiana</i>)	7
SMOOTH ASTER	
(<i>Aster laevis</i>)	6
DANDELION	
(<i>Taraxacum officinale</i>)	3
WILD WHITE GERANIUM	
(<i>Geranium richardsonii</i>)	10
YELLOW PEAVINE	
(<i>Lathyrus ochroleucus</i>)	6

GRASSES

PINEGRASS	
(<i>Calamagrostis rubescens</i>)	22
HAIRY WILDRYE	
(<i>Elymus innovatus</i>)	3
KENTUCKY BLUEGRASS	
(<i>Poa pratensis</i>)	23

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1510(1420-1600) M

ASPECT: SOUTHERLY

SLOPE: 12(3-23)%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

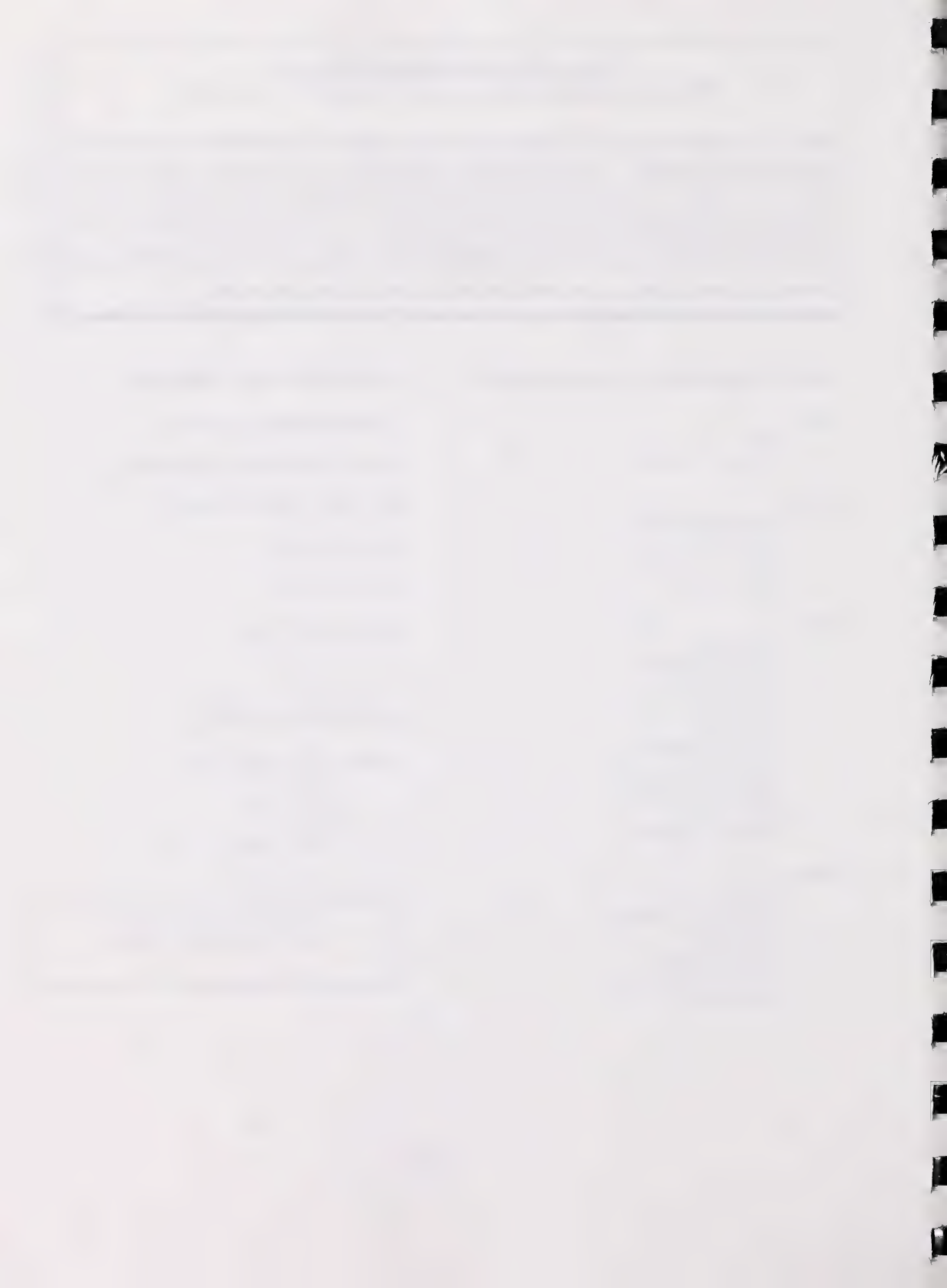
GRASS 2402

FORB 884

SHRUB 0

TOTAL 3286

SUGGESTED STOCKING RATE
0.6 HA/AUM OR 1.3 AC/AUM



G7: Aw/Timothy-Kentucky bluegrass
(*Populus tremuloides*/*Phleum pratense*-*Poa pratensis*)

n=2 This community is similar to the Aw/Rose/Pinegrass community, but heavy grazing pressure has shifted the understory away from native species and allowed dandelion, clover, timothy and Kentucky bluegrass to establish on the site. This change in species composition with increased grazing pressure is similar to work done by Willoughby (1995). The invasion of non-native species onto this site makes this community very productive for domestic livestock, but the presence of overgrazed communities indicates some type of distribution problem and the management of the disposition should be discussed with the permittees.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN (<i>Populus tremuloides</i>)	50
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SHRUBS

WILD RED RASPBERRY (<i>Rubus idaeus</i>)	1
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FORBS

DANDELION (<i>Taraxacum officinale</i>)	26
WILD BERGAMONT (<i>Monarda fistulosa</i>)	6
STRAWBERRY (<i>Fragaria virginiana</i>)	1
WILD WHITE GERANIUM (<i>Geranium richardsonii</i>)	5
CLOVER (<i>Trifolium hybridum</i>)	2

GRASSES

TIMOTHY (<i>Phleum pratense</i>)	33
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	13

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1295(1250-1340) M

ASPECT: SOUTH

SLOPE: 10(0-20)%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 995(956-1034)

FORB 59(0-118)

TOTAL 1054(1034-1074)

SUGGESTED STOCKING RATE 1.7 HA/AUM OR 3.9 AC/AUM

G8: Aw/Snowberry-Saskatoon

(*Populus tremuloides*/*Symphoricarpos occidentalis*(*S.albus*)-*Amelanchier alnifolia*)

n=9 This community is one of several community types which represent the mesic/rich ecosite for the Montane subregion (Archibald et al. 1996). These sites can be dominated by white spruce, aspen or lodgepole pine. The understory can be dominated by thimbleberry, snowberry, saskatoon or pinegrass. Succession of this community type will likely be to white spruce. The Aw/Thimbleberry dominated community type is probably moister and slightly richer than this community type. Forage production on the aspen phase of this ecosite can be quite high averaging 1340 kg/ha. This makes these community types moderately productive for domestic livestock and should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN
(*Populus tremuloides*) 65

SHRUBS

SASKATOON
(*Amelanchier alnifolia*) 15
SNOWBERRY
(*Symphoricarpos occidentalis*, *S. albus*) 38
WHITE MEADOWSWEET
(*Spiraea betulifolia*) 4
ROSE
(*Rosa acicularis*) 3

FORBS

STRAWBERRY
(*Fragaria virginiana*) 6
LINDLEY'S ASTER
(*Aster ciliolatus*) 4
YELLOW PEAVINE
(*Lathyrus ochroleucus*) 4
SHOWY ASTER
(*Aster conspicuus*) 2
CANADA VIOLET
(*Viola canadensis*) 4

GRASSES

HAIRY WILD RYE
(*Elymus innovatus*) 2
PINEGRASS
(*Calamagrostis rubescens*) 3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBMESIC TO MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC To
PERMESOTROPHIC

ELEVATION RANGE (MEAN): 1563(1370-1680) M

ASPECT: SOUTH TO EAST

SLOPE: 14(0-35)%

SOIL DRAINAGE: WELL TO RAPIDLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 390(42-872)
FORB 566(300-1014)
SHRUB 335(10-1022)
TOTAL 1291(520-1708)

SUGGESTED STOCKING RATE
1.4 HA/AUM OR 3.0 AC/AUM

G9: Aw/Snowberry/Kentucky bluegrass
(*Populus tremuloides*/*Symphoricarpos albus*/*Poa pratensis*)

n=2 This community type is very similar to the previously described Aw/Snowberry-Saskatoon community, but has been grazed by livestock. It appears that this community type was grazed heavily in the past and then rested. Willoughby (1995) found that aspen stands that have been heavily grazed for prolonged periods have a low cover of native shrubs, forbs and grass species and a high cover of Kentucky bluegrass, clover and dandelion. This community has a high cover of Kentucky bluegrass, but it also has a high cover of native shrubs, forbs and grass, which may indicate that it has been grazed heavily to the point of Kentucky bluegrass invasion and then rested allowing recovery of the native species. This community is very productive for domestic livestock, but Kentucky bluegrass provides a poor source of forage for wintering wildlife.

PLANT COMPOSITION CANOPY COVER (%)

TREES	
ASPEN (<i>Populus tremuloides</i>)	64
WHITE SPRUCE (<i>Picea glauca</i>)	3
SHRUBS	
ROSE (<i>Rosa acicularis</i>)	6
RED TWINBERRY (<i>Lonicera utahensis</i>)	2
SASKATOON (<i>Amelanchier alnifolia</i>)	1
SNOWBERRY (<i>Symphoricarpos albus</i>)	21
FORBS	
CREeping MAHONIA (<i>Berberis repens</i>)	12
DANDELION (<i>Taraxacum officinale</i>)	7
YELLOW PEAVINE (<i>Lathyrus ochroleucus</i>)	2
STRAWBERRY (<i>Fragaria virginiana</i>)	2
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	4
GRASSES	
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	24
MOUNTAIN BROME (<i>Bromus carinatus</i>)	8
ONION GRASS (<i>Melica spectabilis</i>)	5

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
SOIL DRAINAGE: WELL TO RAPIDLY
ELEVATION: 1414(1372-1457)M
ASPECT: SOUTHERLY
SLOPE: 3(2-4)%

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA	
GRASS	606(516-696)
FORB	749(734-764)
SHRUB	354(0-708))
TOTAL	1709(1460-1958)

STOCKING RATE 1.1 HA/AUM OR 2.4 AC/AUM

G10: Aw/Thimbleberry
(*Populus tremuloides*/*Rubus parviflorus*)

n=7 Nutrient rich seepage occurs at some point in the growing season in this community type favouring the growth of thimbleberry. On these sites thimbleberry is very common south of the Crownsnest Pass and is generally replaced by cow parsnip north of the Pass. Succession on these sites will be from aspen to pine and then to white spruce. Forage productivity on these sites is generally quite high because of the favourable moisture and nutrient conditions. Thimbleberry is generally unpalatable to livestock, but if the site has an abundance of cow parsnip it may be extensively utilized. This community type should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	1
ASPEN (<i>Populus tremuloides</i>)	69
BALSAM POPLAR (<i>Populus balsamifera</i>)	3

SHRUBS

WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	4
THIMBLEBERRY (<i>Rubus parviflorus</i>)	36
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	7
SASKATOON (<i>Amelanchier alnifolia</i>)	7

FORBS

WILD STRAWBERRY (<i>Fragaria virginiana</i>)	4
SHOWY ASTER (<i>Aster conspicuus</i>)	3
COW PARSNIP (<i>Heracleum lanatum</i>)	4
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	6
NORTHERN BEDSTRAW (<i>Galium boreale</i>)	1
WILD WHITE GERANIUM (<i>Geranium richardsonii</i>)	4

GRASSES

HAIRY WILDRYE (<i>Elymus innovatus</i>)	1
PINE GRASS (<i>Calamagrostis rubescens</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC TO MESIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1645(1562-1707)M

ASPECT: SOUTHERLY

SLOPE: 15(8-20)%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	432(36-1194)
FORB	356(300-458)
SHRUB	338 (0-584)
TOTAL	1126(342-1878)

STOCKING RATE
1.6 HA/AUM OR 3.6 AC/AUM

G12: Pb/Thimbleberry
(*Populus balsamifera*/*Rubus parviflorus*)

n=1 This community type was described in the Southend allotment just north of Waterton Lakes National Park at a higher subalpine elevation. It was found in a moist, nutrient rich, lower slope position, which favours the growth of both balsam poplar and thimbleberry. It is very similar to the Aw/Thimbleberry community previously described, but the higher elevation is out of the range of growth conditions for aspen. As a result, balsam poplar dominates the site.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR (<i>Populus balsamifera</i>)	85
ASPEN (<i>Populus tremuloides</i>)	3

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	58
WILLOW (<i>Salix spp.</i>)	30
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	7

FORBS

JESSICA'S STICKSEED (<i>Hackelia jessicae</i>)	10
SMOOTH SWEET CICELY (<i>Osmorhiza chilensis</i>)	8
CANADA VIOLET (<i>Viola canadensis</i>)	8
BANEERRY (<i>Actaea rubra</i>)	6
GREEN FALSE HELLEBORE (<i>Veratrum eschscholtzii</i>)	2

GRASSES

ALASKA ONION GRASS (<i>Melica subulata</i>)	2
NODDING TRisetum (<i>Trisetum cernuum</i>)	1

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1707 M

SLOPE: 4%

ASPECT: SOUTHEAST

SOIL DRAINAGE: MODERATELY WELL

CARRYING CAPACITY

FOREAGE PRODUCTION IN KG/HA

GRASS	36
FORB	1234
SHRUB	684
TOTAL	1954

STOCKING RATE
0.9 HA/AUM OR 2.1 AC/AUM

G13: Pb/Cow parsnip/Kentucky bluegrass
(*Populus balsamifera*/*Heracleum lanatum*/*Poa pratensis*)

n=1 This community type occupies subhygric, lower slope positions. It is similar to the Pb/Thimbleberry community type previously described, but lacks the cover of thimbleberry. Generally, thimbleberry is replaced by cow parsnip north of the Crowsnest Pass. The high moisture and nutrient content of this site make it highly productive. Domestic livestock find cow parsnip palatable. This community should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR
(*Populus balsamifera*) 75

SHRUBS

STICKY CURRANT
(*Ribes viscosissimum*) 9
ROSE
(*Rosa acicularis*) 5

FORBS

SHOWY ASTER
(*Aster conspicuus*) 26
CANADA VIOLET
(*Viola canadensis*) 25
SWEET CICELY
(*Osmorhiza chiiensis*) 11
COW PARSNIP
(*Heracleum lanatum*) 8
VEINY MEADOW RUE
(*Thalictrum venulosum*) 6

GRASSES

SEDGE
(*Carex spp.*) 11
KENTUCKY BLUEGRASS
(*Poa pratensis*) 10

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1424 M

SLOPE: 3 %

ASPECT: SOUTHWEST

SOIL DRAINAGE: MODERATELY WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 4
FORB 856
SHRUB 1010
TOTAL 1870 *ESTIMATE

STOCKING RATE
1.0 HA/AUM OR 2.2 AC/AUM

G14: Pb/Snowberry
(*Populus balsamifer/Symphoricarpos occidentalis*)

n=4 This community is very similar to the Pb/Snowberry dominated community described by Archibald et al. (1996) on moist lower slope positions where seepage occurs in the spring or after heavy rain. It is also similar to the Spruce-Pb/Snowberry previously described, but this community is not as successional advanced. The high moisture and nutrient content of the site makes this community highly productive, but the majority of the production is coming from snowberry which is generally unpalatable to livestock at proper stocking levels. This community should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER (%)

TREES

BALSAM POPLAR
(*Populus balsamifera*) 65

SHRUBS

SNOWBERRY
(*Symphoricarpos occidentalis*
S. albus) 51
THIMBLEBERRY
(*Rubus parviflorus*) 1
WATER BIRCH
(*Betula occidentalis*) 17
ROSE
(*Rosa acicularis*) 10

FORBS

CANADA VIOLET
(*Viola canadensis*) 25
WILD WHITE GERANIUM
(*Geranium richardsonii*) 4
LINDLEY'S ASTER
(*Aster ciliolatus*) 1
DANDELION
(*Taraxacum officinale*) 4
STRAWBERRY
(*Fragaria virginiana*) 3

GRASSES

KENTUCKY BLUEGRASS
(*Poa pratensis*) 5
ALASKA ONION GRASS
(*Melica subulata*) 2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC TO SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1518(1509-1527) M

SLOPE: 1(0-2)%

ASPECT: NORTH

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 333(44-732)
FORB 483(224-646)
SHRUB 893(530-1574)
TOTAL 1760(1554-1884)

STOCKING RATE
1.0 HA/AUM OR 2.2 AC/AUM

G15: Aw/Birch-Willow
(*Populus tremuloides*/*Betula occidentalis*-*Salix glauca*)

n=1 This community was described adjacent to a pond in the Southend allotment just north of Waterton Lakes National Park. Both water birch and smooth willow are well adapted to growing adjacent to streams and ponds. What is unusual about this community is the high aspen and pinegrass cover. Aspen and pinegrass are usually associated with more mesic sites. The high cover of willow, water birch and aspen limit the light reaching the forest floor. Therefore there is only moderate production for domestic livestock. This community should be rated as non-use.

PLANT COMPOSITION CANOPY COVER (%)

TREES

ASPEN (<i>Populus tremuloides</i>)	90
WHITE SPRUCE (<i>Picea glauca</i>)	4

SHRUBS

WATER BIRCH (<i>Betula occidentalis</i>)	21
SMOOTH WILLOW (<i>Salix glauca</i>)	21
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	15
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	15

FORBS

SHOWY ASTER (<i>Aster conspicuus</i>)	10
STRAWBERRY (<i>Fragaria virginiana</i>)	8
WINTERGREEN (<i>Pyrola asarifolia</i>)	7
SMOOTH ASTER (<i>Aster laevis</i>)	7
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	4

GRASS

PINEGRASS (<i>Calamagrostis rubescens</i>)	15
ALASKA ONION GRASS (<i>Melica subulata</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): SUBHYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION: 1600M

SOIL DRAINAGE: MODERATELY WELL TO POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	804
FORB	452
SHRUB	622
TOTAL	1878

STOCKING RATE
NON-USE

MONTANE CUTBLOCKS

In order to classify the cutblocks of the Montane subregion properly and understand the successional sequences which occur after harvesting the preharvest community type and year the stand was harvested must be determined. This information was not available for this classification and therefore it was difficult to determine the successional pathways. For example many cutblocks in the Castle area and Porcupine Hills are not regenerating trees. It is not clear if these sites will always have difficulty growing trees because they were historically grasslands or if some other disturbance factor is influencing tree regeneration. Heavy grazing and competition from grass species can influence tree regeneration, heavy grazing pressure was described on a number of cutblocks in the Castle area. These cutblocks had been grazed so heavily that the agronomic species (Kentucky bluegrass, timothy and clover) dominated the sites and a number of sites had been seeded with creeping red fescue which can compete with tree seedlings for moisture and nutrients.

Cutblocks can be an important source of forage for domestic livestock. They produce on average twice as much as deciduous stands and nearly three times more than conifer stands. This production varies from area to area in the Montane. Generally the production averages 1800 to 1900 kg/ha in the Castle and Porcupine Hills and drops dramatically in the Gap area to 700 kg/ha. It must be remembered that this increase in forage is only temporary. As the cutblock undergoes succession there will be a corresponding drop in forage production. Increases in carrying capacity after harvesting can be acquired through a temporary permit.

In order to understand the forage productivity on cutblocks between different areas of the Montane the cutblocks were split into the Gap, Castle and Porcupine Hills. It must be remembered that maximum forage productivity does not occur on a cutblock until it is approximately 3 years old. One year old cutblocks will generally have less than half the total production of a 3 year old block.

Table 5. Cutblock community types in the Montane subregion.

Community number	Community type	Productivity (kg/ha)				Moisture	Drainage	Carrying Capacity (ha/AUM)
		Grass	Forb	Shrub	Total			
Cutblocks in Gap area								
H1	Pine blocks	307	416	15	739	Mesic	Well	2.5
H2	Pine-Spruce blocks	112	580		692	Mesic	Well	2.6
Cutblocks in Castle area								
H3	Kentucky bluegrass-Timothy	1208	789	184	2181	Mesic	Well	0.9
H4	Creeping red fescue	503	704	457	1663	Mesic	Well	1.1
H5	Beaked sedge	3994	16	0	4010	Hygic	Poorly	0.5
H6	Subalpine fir	550	1106	190	1846	Mesic	Well	1.0
H7	Pine-Spruce/Pinegrass	831	973	116	1953	Mesic	Well	1.0
Cutblocks in Porcupine Hills								
H8	Pine blocks	1392	370	152	1914	Mesic	Well	0.9

H1: Pine blocks (Gap)

(*Pinus contorta*)

n=24 These cutblocks were described in the Gap allotment just north of Crowsnest Mountain. These blocks are probably more representative of the Subalpine subregion than the Montane.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	6
WHITE SPRUCE (<i>Picea glauca</i>)	3

SHRUBS

BRISTLY BLACK CURRANT (<i>Ribes lacustre</i>)	5
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FORBS

FIREWEED (<i>Epilobium angustifolium</i>)	5
STRAWBERRY (<i>Fragaria virginiana</i>)	12
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	4
DANDELION (<i>Taraxacum officinale</i>)	2
SMOOTH ASTER (<i>Aster laevis</i>)	5

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	7
SEDGE SPP. (<i>Carex spp.</i>)	5
HAIRY WILDRYE (<i>Elymus innovatus</i>)	3

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): Mesic

NUTRIENT REGIME (MEAN): MESOTROPHIC (3.0)

ELEVATION: 1767(1585-1890) M

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	307(0-962)
FORB	416(140-586)
SHRUB	15(0-84)
TOTAL	739(408-1102)

SUGGESTED STOCKING RATE
2.5 HA/AUM

H2: Pine-Spruce blocks (Gap)

(*Pinus contorta*-*Picea glauca*)

n=6

PLANT COMPOSITION CANOPY COVER (%)

TREES		
WHITE SPRUCE		
(<i>Picea glauca</i>)	15	
LODGEPOLE PINE		
(<i>Pinus contorta</i>)	12	
SHRUBS		
WILLOW SPP.		
(<i>Salix spp.</i>)	4	
FORBS		
LINDLEY'S ASTER		
(<i>Aster ciliolatus</i>)	28	
WILD STRAWBERRY		
(<i>Fragaria virginiana</i>)	28	
FIREWEED		
(<i>Epilobium angustifolium</i>)	7	
DANDELION		
(<i>Taraxacum officinale</i>)	3	
FIELD HORSETAIL		
(<i>Equisetum arvense</i>)	5	
GRASSES		
SEDGE SPP.		
(<i>Carex spp.</i>)	22	
SLENDER WHEATGRASS		
(<i>Agropyron trachycaulum</i>)	5	
PINEGRASS		
(<i>Calamagrostis rubescens</i>)	2	

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1752(1707-1829) M

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	112(0-276)
FORB	580(0-950)
TOTAL	692(276-954)

STOCKING RATE 2.6 HA/AUM

H3: Kentucky bluegrass-Timothy (Castle) (*Poa pratensis*-*Phleum pratense*)

n=12 This community type represents cutblocks that have been heavily grazed by livestock. Heavy livestock grazing favours the growth of invaders Kentucky bluegrass and timothy. The grazing pressure which favours the growth of these grass species is usually detrimental to the growth of trees. Cattle damage to the conifer trees is usually trampling damage which scars the trees and breaks the stem.

PLANT COMPOSITION CANOPY COVER (%)

TREES

WHITE SPRUCE (<i>Picea glauca</i>)	T
LODGEPOLE PINE (<i>Pinus contorta</i>)	1
ASPEN (<i>Populus tremuloides</i>)	8

SHRUBS

WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	2
SASKATOON (<i>Amelanchier alnifolia</i>)	1

FORBS

FIREWEED (<i>Epilobium angustifolium</i>)	4
STRAWBERRY (<i>Fragaria virginiana</i>)	11
ASTER SPP. (<i>Aster spp.</i>)	4
YARROW (<i>Achillea millefolium</i>)	9

GRASSES

KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	31
SEDGE (<i>Carex spp.</i>)	9
PINEGRASS (<i>Calamagrostis rubescens</i>)	7
TIMOTHY (<i>Phleum pratense</i>)	7

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION RANGE (MEAN): 1491(1372-1707) M
ASPECT: VARIABLE
SLOPE: 9(0-32)%
SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	1208(20-1578)
FORB	789(118-1220)
SHRUB	184(0-540)
TOTAL	2181(1578-2686)

STOCKING RATE
0.9 HA/AUM

H4: Creeping red fescue (Castle) (*Festuca rubra*)

n=6 This community type represents cutblocks that have been heavily grazed and seeded with creeping red fescue. Creeping red fescue a rhizomatous grass can quickly form a sod on the top of the soil, which makes it difficult to grow trees. These seeded cutblocks can be very productive for domestic livestock, but it will be very difficult to regenerate trees on these sites.

PLANT COMPOSITION CANOPY COVER (%)

TREES	
LODGEPOLE PINE (<i>Pinus contorta</i>)	1
SHRUBS	
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	3
BUFFALOBERRY (<i>Shepherdia canadensis</i>)	1
FORBS	
STRAWBERRY (<i>Fragaria virginiana</i>)	3
SHOWY ASTER (<i>Aster conspicuus</i>)	1
LINDLEY'S ASTER (<i>Aster ciliolatus</i>)	2
CLOVER (<i>Trifolium repens</i>)	17
FIREWEED (<i>Epilobium angustifolium</i>)	3
GRASSES	
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	2
TIMOTHY (<i>Phleum pratense</i>)	3
CREEPING RED FESCUE (<i>Festuca rubra</i>)	41

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION RANGE (MEAN): 1560(1433-1829))M

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
GRASS 503(324-770)
FORB 704(0-2036)
SHRUB 457(0-892)
TOTAL 1663(770-2664)

SUGGESTED STOCKING RATE 1.1 HA/AUM

H5: Beaked sedge(Castle)

(*Carex rostrata*)

n=1 This community was described in a moist, poorly drained spot within a Pine-Spruce cutblock. It is more representative of a wet sedge meadow. It is likely this community type will never grow trees because of the wet moisture conditions. These sites can be very productive for domestic livestock. When situated within a cutblock the livestock will utilize the drier edges of this community type extensively. This community type may also represent the only water to be found within a cutblock.

PLANT COMPOSITION CANOPY COVER (%)

FORBS

NORTHERN WILLOWHERB (<i>Epilobium ciliatum</i>)	4
SWAMP HORSETAIL (<i>Equisetum fluviatile</i>)	1

GRASSES

BEAKED SEDGE (<i>Carex rostrata</i>)	93
NARROW REEDGRASS (<i>Calamagrostis stricta</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): HYGRIC

NUTRIENT REGIME (MEAN): PERMESOTROPHIC

ELEVATION RANGE (MEAN): 1430M

SOIL DRAINAGE: POORLY

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS 3994

FORB 16

TOTAL 4010

SUGGESTED STOCKING RATE
0.5 HA/AUM

H6: Subalpine fir blocks (Castle)

(*Abies lasiocarpa*)

n=9 These cutblocks represent higher elevation sites within the Castle area. Subalpine fir is usually indicative of the Subalpine subregion (Archibald et al. 1996).

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	3
WHITE SPRUCE (<i>Picea glauca</i>)	6
SUBALPINE FIR (<i>Abies lasiocarpa</i>)	24

SHRUBS

THIMBLEBERRY (<i>Rubus parviflorus</i>)	17
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	1
FALSE AZALEA (<i>Menziesia ferruginea</i>)	10

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	10
SHOWY ASTER (<i>Aster conspicuus</i>)	3
WESTERN MEADOW RUE (<i>Thalictrum occidentale</i>)	4
FIREWEED (<i>Epilobium angustifolium</i>)	9

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	4
SEDGE SPP. (<i>Carex spp.</i>)	4
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION: 1652(1494-1798) M
ASPECT: VARIABLE
SLOPE: 21(8-37)%
SOIL DRAINAGE: MODERATELY WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA
GRASS 550(32-1030)
FORB 1106(470-1802)
SHRUB 190(0-650)
TOTAL 1846(1222-2484)

SUGGESTED STOCKING RATE
1.0 HA/AUM

H7: Pine-Spruce/Pinegrass (Castle)
(*Pinus contorta*-*Picea glauca*/*Calamagrostis rubescens*)

n=52 This community type is typical of undisturbed cutblocks in the Castle area of the province. Many of these cutblocks are not regenerating trees. It is not clear if these sites are not regenerating trees because they were historically grasslands or if some other factor is influencing tree regeneration.

PLANT COMPOSITION **CANOPY COVER (%)**

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	10
WHITE SPRUCE (<i>Picea glauca</i>)	5

SHRUBS

WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	3
THIMBLEBERRY (<i>Rubus parviflorus</i>)	3
SNOWBERRY (<i>Symphoricarpos occidentalis</i>)	3

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	11
FIREWEED (<i>Epilobium angustifolium</i>)	4
AMERICAN VETCH (<i>Vicia americana</i>)	2
YELLOW PEAVINE (<i>Lathyrus ochroleucus</i>)	2
SHOWY ASTER (<i>Aster conspicuus</i>)	3

GRASSES

PINEGRASS (<i>Calamagrostis rubescens</i>)	15
KENTUCKY BLUEGRASS (<i>Poa pratensis</i>)	4
SEDGE SPP. (<i>Carex spp.</i>)	5
TIMOTHY (<i>Phleum pratense</i>)	2

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC

NUTRIENT REGIME (MEAN): MESOTROPHIC

ELEVATION: 1529(1432-1800) M

ASPECT: VARIABLE

SLOPE: 13(0-33)%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	831(42-2698)
FORB	973(104-1732)
SHRUB	116(0-588)
TOTAL	1953(378-3582)

SUGGESTED STOCKING RATE
1.0 HA/AUM

H8: Pine blocks (Porcupine hills)
(*Pinus contorta*)

n=5 This community type is typical of undisturbed cutblocks in the Porcupine Hills. Many of these cutblocks are not regenerating trees. It is not clear if these sites will always have difficulty growing trees because they were historically grasslands or if some other factor is influencing tree regeneration.

PLANT COMPOSITION CANOPY COVER (%)

TREES

LODGEPOLE PINE (<i>Pinus contorta</i>)	T
ASPEN (<i>Populus tremuloides</i>)	1

SHRUBS

ROSE (<i>Rosa acicularis</i>)	3
RASPBERRY (<i>Rubus idaeus</i>)	4
WHITE MEADOWSWEET (<i>Spiraea betulifolia</i>)	3
THIMBLEBERRY (<i>Rubus parviflorus</i>)	3

FORBS

STRAWBERRY (<i>Fragaria virginiana</i>)	3
HEART-LEAVED ARNICA (<i>Arnica cordifolia</i>)	6
WILD STRAWBERRY (<i>Fragaria virginiana</i>)	3
SHOWY ASTER (<i>Aster conspicuus</i>)	6
BUNCHBERRY (<i>Cornus canadensis</i>)	8

GRASSES

HAIRY WILD RYE (<i>Elymus innovatus</i>)	12
PINEGRASS (<i>Calamagrostis rubescens</i>)	17

ENVIRONMENTAL VARIABLES

MOISTURE REGIME (MEAN): MESIC
NUTRIENT REGIME (MEAN): MESOTROPHIC
ELEVATION RANGE (MEAN): 1561(1494-1676) M

ASPECT: SOUTH TO SOUTHWEST

SLOPE: 13(0-20)%

SOIL DRAINAGE: WELL

CARRYING CAPACITY

FORAGE PRODUCTION IN KG/HA

GRASS	1392(606-2778)
FORB	370(106-606)
SHRUB	152(34-422)
TOTAL	1914(798-3452)

SUGGESTED STOCKING RATE
0.9 HA/AUM

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